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ABSTRACT

The Task Force on Women, Minorities, and the Handicapped in Science and Technology was established by the U.S. Congress in Public Law 99-383 with the purpose of developing a long-range plan for broadening participation in science and engineering. Public hearings were held in Albuquerque (New Mexico), Atlanta (Georgia), Baltimore (Maryland), Boston (Massachusetts), Chicago (Illinois), Kansas City (Missouri), and Los Angeles (California) between Fall 1987 and Spring 1988. The final report of the task force was produced in December, 1989. This document is the verbatim transcript of the public hearing. Co-Chairs Mr. Jaime Oaxaca and Dr. Ann Reynolds conducted the hearing. Following an opening statement by co-chair Dr. Reynolds, speakers included: (1) Dr. Dewayne Matthews; (2) Ms. Elizabeth Gallegos; (3) Mr. Gregory P. Kennedy; (4) Dr. Jack Cole; (5) Mr. Robert L. Knutilla; (6) Ms. Louella Marr; (7) Ms. Katherine Harris Tijerina; (8) Mr. Norbert Hill; (9) Ms. Sheila Tobias; (10) Dr. Julie Haynes Lutz; (11) Dr. Nina Kay; (12) Mr. Tony Gallegos; (13) Mr. Francisco Guevara; (14) Dr. Matthew D. Padilla; (15) Ms. Rosemary Frederickson; (16) Mr. Gary Townsend; (17) Mr. Jerry Watkins; (18) Mr. Ted Barber; (19) Dr. Richard Griego; (20) Dr. John Foley; (21) Dr. Nancy Felipe Russo; (22) Dr. Henry J. Casso; (23) Ms. Connie Alexander; (24) Ms. Barbara Torres; (25) Dr. Leo Gomez; (26) Dean Ann Erickson; (27) Mr. Jim Tarro; and (28) Dr. Kirk MacGugan. (CW)

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Public Hearing

1634 University

Albuquerque, New Mexico

September 22, 1987

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MS. MIRIAM (GULLY) WALTER, Member
DOCTOR LUTHER WILLIAMS, Member
MS. VERA (NINA) WINKLER, Member

* * * *

DOCTOR REYNOLDS: I would like to convene the Task Force on Women, Minorities and the Handicapped in Science and Technology. We thank you for coming, many of you from long distances, and thank you for your commitment and willingness to participate. I should indicate to everyone, including the members of the commission and those of you about to testify,

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it is very important for purposes of the record and to help our recorder that you do use microphones, and we have a special request that we all tend to use lingo. We use initials and quick lingo about various agencies. Those are particularly hard to record, so I would like to ask that if you come to an acronym or a series of initials that you do take the time to indicate those clearly so that we will end up with a correct record. Otherwise, we might have surprising comments from members of the Task Force and people testifying.

As you know, this Task Force is to study the participation in science and technology of this nation by women, minorities and the handicapped. We all recognize that that very special group I have just named is not represented in the sciences, in mathematics at a level equal to their representation in the population. We are studying this issue optimistically, and with what we believe will be a real design towards increasing participation and strengthening their former scientific establishment in our ability to be a major player in the world and a major economic strength. We believe this is a very, very important commitment. Everyone on the Task Force has accepted this commitment most fully.

Now, I would like to begin very, very close to being right on time, and indicate to each of you about to testify that you will have nine minutes to speak. A subtle little buzzer will go off at that point in which you have a

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minute to finish up, and then we will allow five minutes for questioning. Our first person testifying today is Mr. Dewayne Matthews, executive director, New Mexico Commission on Higher Education. Mr. Matthews, would you come forward, please, to that table? Thank you.

MR. MATTHEWS: Thank you very much, Madam Chairman, Mr. Chairman, members of the Task Force. It is a great honor for me to be the lead-off speaker, I suppose, and to welcome all of you to the State of New Mexico and to the southwest region of the United States. I hope that your visit here is a very pleasant one and a very productive and worthwhile one. I would like to, of course, begin by congratulating you and commenting to you to a certain extent on the topic which this group has chosen for emphasis and for study. It is obviously one of great importance to the nation, but I would submit that it is one of particular importance to those of you in the southwest part of the United States, not because of the situation here, not that the states in this part of the country are any different than the rest of the nation, but because we are already well along the road of understanding the impacts of the demographic changes in the United States, particularly as it affects the southwest. We are doing a great deal of work on this and we are finding out that this is having a tremendous impact on the way that we will do our business here in the southwest and in New Mexico. I hope to

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share with you a little bit of this information today, and I would hope also that other speakers or other visits that you will also get a great deal of very valuable information.

First of all, let me introduce myself. My name is Dewayne Matthews. I'm the executive director of the Commission on Higher Education. The Commission on Higher Education for the State of New Mexico is the state level agency with coordinating functions for the state's higher education system. The higher education system in New Mexico, which consists of six four-year institutions, three of which grant the doctoral degrees and a system of about seventeen two-year institutions, including both community colleges, branch colleges and vocational institutes. New Mexico has a history of having a very strong commitment to public education. We have a very small, in fact, almost negligible private sector in education, and as a result of this, approximately seventy-eight percent of New Mexico's state budget is committed directly to education, both public school and higher education level.

Education is extremely important to New Mexico historically and remains so, and you will see the reasons why. First of all, I would like to discuss for just a moment why this issue is so important to the nation. I don't think -- I think to a certain extent I'm probably preaching to you here, but I would like to say a little bit of our understanding of

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this issue and why it is so important. I would like to quote the statistics I heard from Secretary Brock of the Department of Labor. It had to do with the new job creation occurring in the United States. Over the last four years, according to Secretary Brock, American economy saw a net loss of three million jobs that paid less than six dollars an hour, but saw a net increase in two million jobs that paid between six and ten dollars an hour, and a net increase of eleven million jobs paying over ten dollars an hour.

If these statistics are true, I have no reason to doubt that they aren't, it demonstrates a couple things. First of all, it demonstrates that the American economy remains vital and is still continuing to create jobs, and that there are opportunities being created today for our citizens, something that sometimes I think we tend to lose sight of. Secondly, it also demonstrates that those jobs that are being created are jobs which are high-paying jobs, they are good jobs, they are jobs which people want to have, but they are obviously jobs which require a great deal of training, which require skills, and which require individuals which have the ability to perform in those positions. They are high-paying jobs, they are jobs probably which have a heavy volume of technology and a heavy component of skills. Of course, this demonstrates that education, the training and skill development is going to be extremely important and is

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extremely important to allow people to go into these positions, to build careers, provide for their families and so forth.

However, as you well know, the trends in our society, also we have to look at the flow of individuals into these positions and what is happening there. To a large extent this has to do with the demographics. Nationally, as you know, one of the major features is the rapidly growing -- the rapid increase of women in the workplace. Also, the rapid increase of minority populations, particularly in the southwest, but also nationwide and other statistics which I heard from Secretary Brock is that by the year 2000 the new people entering the work force will comprise -- eighty percent of those new people entering the work force in the year 2000 will be either women, minorities or immigrants. Eighty percent of the people entering the work force in the year 2000 will be from those three groups.

Obviously the participation of individuals who have traditionally been underrepresented in our society and in our workplace must be increased. Why? Because if they are not, the nation will find that its supply of highly-skilled, highly-trained individuals will be choked off, economic growth will slow, and of course, the vitality of the nation itself will be at risk, and this is why this is such an important issue. Not because it is not an issue for all of the

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traditional reasons, but -- this is why perhaps it is not an issue, but perhaps this is the reason why it is obtaining the attention that it is receiving today, what is happening in New Mexico, and we will bring things a little bit closer to home and I realize that you are looking at many states besides New Mexico, but I would like to think that New Mexico is somewhat a trend setter in these areas. So I will give you a few statistics having to do with the State of New Mexico, and for now I am going to mention the growth of the minority populations in New Mexico and I think it is relevant for consideration of both women and handicapped because I think that many of the solutions and many of the actions which must be taken will be found to be applicable across all of these groups.

First of all, in the State of New Mexico, New Mexico is proud to be one of the states, perhaps the state with one of the highest minority populations in the United States. New Mexico is right now in overall population fifty-three percent Anglo, as we say around here or other things. I believe that the Census Bureau term is white, non-Hispanic. About thirty-five percent Hispanic and about eight percent Native American, the largest Native American population in the nation. That, of course, demonstrates a very large, a very vibrant minority population in the state. However, if you break it down by age categories, which the

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census bureau has done for us, at age nineteen and below New Mexico is already a majority minority state. Only forty-nine percent of the State of New Mexico is Anglo at age nineteen and below. At age fourteen and below, New Mexico is a plurality Hispanic. There are more Hispanic young people at age fourteen and below than Anglo, and zero to three, that population, that is only forty percent Anglo and is close to fifty percent Hispanic. The Native American population in New Mexico, by the way, grows as well from eight percent of the total population to thirteen percent of the population in that youngest age group.

What does this mean? Well, for higher education in New Mexico it means that our traditional high participation rates by minorities are not high enough. Right now New Mexico's overall participation rate is about sixty-three percent Anglo and about sixty-six percent of the recipients are Anglos. I think New Mexico probably has as good a record as any in the nation, perhaps better than most in education of minority young people. However, it is clear that New Mexico itself is not doing nearly enough to provide, again, the highly-trained, highly-skilled work force which the future will demand and finally, there is a particular concern at the highest levels of education that the doctoral degree in the technical areas because right now in New Mexico that group is about seventy-five percent Anglo, the degree of recipients at

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the doctoral degree level.

To summarize what this means is that the nation and the State of New Mexico are facing this challenge. We need all the students we can get. We need to produce all the graduates we can. The nation has been willing and has been able to tolerate things like twenty-seven percent high school dropout rates simply because the nation has been willing to afford it, but in the future whether we are willing to do so or not, and I certainly hope that we are not, the nation simply will not be able to continue to afford those kinds of dropout rates. It cannot continue to afford to allow these brains, these bright minds to be wasted. So, as a result, I think the challenges to find ways to bring people into the educational system, to get them the training, and lastly, I hope that I never used the word problem in describing this. I think what we are facing is a grand opportunity, an opportunity which this nation has perhaps never yet faced. Thank you.

DOCTOR REYNOLDS: Thank you, Mr. Matthews. Questions from the Task Force committee?

DOCTOR ADAMS: I was going to simply say -- my name is Howard Adams -- if you could make one suggestion to us from the standpoint of higher education in terms of policy that we might deal with in terms of assisting you with the demographic changes, what would that one thing be?

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MR. MATTHEWS: I believe that what we need to do is to promote access to the universities. Not simply to provide access, but to actually promote access. There's some exciting programs which you will hear -- some of them you will hear about today that actually go out and try to make sure that students have the information they need to be able to come into the universities and colleges, to go into fields which they perhaps had not considered before. Traditionally I think the university to the higher education system has relied upon parents who went to college to go pass the word onto their children. What we are dealing with are going to be young people who are going to be the first generation of their families to go to the college, and we need to go out and we need to get the word to those young people that they can go to college, that they can go into these fields and that they do have these opportunities.

That's what I mean by saying that the solutions, if you will, apply to all groups, be they minorities, be it women, be it handicapped, be it others who have traditionally not been represented in the higher education system or in the economy at large. There are many, many examples of those kinds of programs.

I would simply make one observation, and that is that I think that the enormity of this challenge and this opportunity which is, in fact, that we are dealing not with a

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minority anymore, but a majority, at least in New Mexico, demonstrates that it is not going to be limited, small focused special programs that are going to do the job. We have got to take those programs. We have got to bring them into the mainstream and we have got to allow the techniques, the principles which those programs have learned over time to demonstrate how our entire approach to, for example, student service in the university should be conducted.

MR. REYES: Mr. Matthews, as you know, New Mexico has a significant rural population. Basically the urban centers are Santa Fe, Albuquerque, Las Cruces and perhaps Alamogordo. Can you tell us what the trends are with respect to the growing Hispanic and minority populations and whether there's any noticeable differences in the trends on the entrance of Hispanics and women into the sciences and engineering from the rural areas as opposed to the urban areas?

MR. MATTHEWS: Unfortunately I do not have strong data to tell you about the trends of participation between rural areas and urban. It is something we are studying now at the commission. We have a large project on looking at demographics, and we hope to have some information on that, and I apologize for not having that. I perhaps will be able to provide you with some before the end of hearing. That is an extremely important issue. I would say in New Mexico's case, for one particular reason, I believe that the rural-

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urban split, if you will, is in large measure the cause behind the shockingly low participation rates by Native Americans in our higher education system and in our state's economy in general. In particularly dealing with Native Americans, you are dealing with a rural population and that creates severe problems. Traditionally we have simply relied upon people moving to the urban areas. I think through the application of technology, telecourses, telecommunications and so forth we can get the courses out to the people, and I hope to have some data on the participation.

DOCTOR REYNOLDS: Thank you very much. We appreciate that, Mr. Matthews. I would like now to move on, and recognize -- I believe it's Elizabeth Gallegos who is here representing Senator Bingaman's district who wish to make a few remarks to the group.

MS. GALLEGOS: Thank you, Madam Chairwoman and members of the Task Force. Good morning and welcome to New Mexico. I'm Elizabeth Gallegos, and I'm Senator Bingaman's district coordinator and Central New Mexico representative. Senator Bingaman can't be here this morning, but he did wish to submit a statement for your record. I wish to commend the Task Force on Women, Minorities and the Handicapped in Science and Technology at the beginning of this series of public hearings, and to express my appreciation for being asked to submit testimony. I'm sure the Task Force will make a valuable

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contribution to the science and technology policy of our nation. Its work is particularly important for at least two reasons.

First, discrimination is an anti-symmetric to American values. We are a pluralistic society entrenched by our differences. Discriminatory barriers, intentional or unintentional must be identified and removed. The human costs of blocked opportunities and wasted dreams are unacceptable to this nation whose creation was based on the principles of life, liberty and the pursuit of happiness.

Second, it is important to make available as many opportunities in science and technology to as many of our citizens as possible. We need more highly trained individuals if we are to retain our competitive age in the world economy. Japan, for example, graduates more than twice as many engineers per capita as the United States. The need is essentially acute at the doctorate level. For example, one study pointed out that in 1983 almost twenty-five percent of the budgeted full-time faculty positions in the United States engineering schools were vacant. More than fifty-five percent of all doctorate engineering degrees awarded in the United States since 1983 have been to foreign students, almost half of whom return to their native countries. To construct and maintain barriers to prohibit certain groups from seeking careers in science and technology is both -- in both human and

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economic terms. We need more, not fewer scientists and engineers.

As part of your study I urge you to pay special attention to the problems of Hispanic and Native Americans in science and technology. Our national survey revealed that in 1983 only two point three percent of all engineers were Hispanic. In New Mexico, the 1980 census indicated that of a Hispanic work force of nearly two hundred thousand, only one hundred twenty-five were engineers. Studies also show that salaries of Hispanic engineers have been on average lower than those of Anglo engineers. However, I hope you will look beyond some of these statistics.

For example, some statistics indicate that Native Americans are doing quite well in science and technology. Their salaries are higher and unemployment rates lower than average. I would submit, however, that these statistics hide the true status of Native Americans in science and technology because they are based on such small numbers. One study claims that there were roughly nine thousand five hundred Native American engineers, and approximately seven thousand Native American scientists working in the US in 1983. While it is true these figures support the proposition that there are Native Americans in the work force, it cannot be disputed that Native Americans are underrepresented in the work force in general, and that in proportion to the total population

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Native Americans are underrepresented in scientific and technological professions.

During your study I hope you will dig deeper than these statistics and discuss the methods by which all Americans can enjoy equal access to all the opportunities available in science and engineering. The key, I believe, to expanding opportunities in science and technology is to begin early in our children's education. In all too many cases, minority children do not have access to the opportunities that are available to others for training in math and science. The recent report by the Committee for Economic Development Children in Need stressed the human and social cause of educationally disadvantaged children and the benefits of early intervention. We desperately need to upgrade the ability of our schools to teach science and math to all students.

Unfortunately the door of opportunities in science and technology is slammed shut to students caught in an educational system that cannot even teach competence and basic skills. I hope the Task Force will address the issue of early education and carefully explore methods for improving our educational system to make opportunities in science and technology available to all our children. I believe that these improvements must come not from a single source, but from uniformity of effort involving federal, state and local government and the private sector. I hope your report will

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show how this can be accomplished. Thank you for this opportunity to share my thoughts with you, and I look forward to reading your report.

DOCTOR REYNOLDS: Thank you very much, Ms. Gallegos, and please convey to Senator Bingaman we hope we meet the challenge.

MS. GALLEGOS: Thank you.

DOCTOR REYNOLDS: Our next witness is Mr. Gregory P. Kennedy, executive director from the Space Center at Alamogordo.

MR. KENNEDY: Good morning, ladies and gentlemen. I'm Gregory Kennedy, director of the Space Center in Alamogordo, New Mexico. The Space Center comprises the International Space Hall of Fame, the Clyde W. Tombaugh Space Theater, the John Stapp Air and Space Park and Shuttle Camp 2001. We are first and foremost a museum. That is, a repository for objects and relics relating to the history of space exploration. Along with this, however, we also have a strong commitment to education and have numerous educational programs which include our teacher newsletter, science fair assistance program, planetarium shows, school tours and Shuttle Camp. Of these programs, the Shuttle Camp is the largest and this is the program I will discuss today.

The Shuttle Camp is a summer rocket treatment space science camp. The program is divided through three levels,

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Mercury or grades three and four, Gemini for grades five and six, and Apollo for students in seventh through ninth grades. It is relatively new, just entering its third year, but it has already been quite successful. The first year we had ninety-three students. This past summer enrollment grew to a hundred and forty. However, a real measure of a success of this program is reflected by the fact that forty-six of this year's camp participants were returnees from 1986. In 1987, thirty of our hundred and forty participants were girls, which included five returnees for the Apollo II class, our most advanced level.

What makes this program so successful? At the space center we believe it is due in large part to the unique opportunities for learning offered in a museum setting. Our emphasis throughout the program is on student participation. We plan activities which are entertaining and educational. For Shuttle Camp even tours of the museum portion of our operation support hands-on activities. For example, we have exhibits which show different types of space suits, explain details of their construction and tell how they work. Then to reenforce the lessen on life support in space, Shuttle Campers get to try on a space suit. In the same lesson, they see samples of space food on exhibition, then have an opportunity to prepare and sample free dried foods. Usually after this exercise you find most of the students at the candy machine.

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Campers learn the value of computers and communications as they conduct space mission simulations. Our displays include actual rockets and rocket motors. After seeing these, each student builds and launches their own flying model rocket. They learn that the same basic principles which govern large rockets also apply to their small models. Because we are a museum, we possess objects which can be used in educational programs. These include spacesuits and life support equipment, historical documents, rocket motors and guidance systems. While not all are feasible for hands-on activities by the campers, some are. Others can be used in museum tours, or copies may be suitable for classroom use.

The blending of historical and technical artifacts, classroom instruction and hands-on activities makes the learning experience of Shuttle Camp unique. By providing opportunities to touch, taste, see, hear, operate and experience, we are providing opportunities for inquiring young people to personalize the information they receive. Hopefully this proces[s] will stimulate further interest on their part and will help [l]ead them to careers in science or engineering. Thank you very much.

DOCTOR REYNOLDS: Questions?

MS. BISHOP: I'm interested in this space center, and I wondered, are you getting students strictly from the state or

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is this a national program or how does one get involved?

MR. KENNEDY: Right now we are limited to a day camp program, which means that they have to have family or friends in the Alamogordo area or commute back and forth from -- we have had a lot of students coming from El Paso every day, which is a two-hour drive to Alamogordo. We are at this time under the sponsorship of our museum foundation seeking funding for a nine-thousand-square-foot facility which will include dormitories. At that point we hope to operate a national program. Right this past year we had one hundred and sixty-seven percent increase in out-of-state enrollments, but again, these were children that had family and friends in the community.

DOCTOR REYNOLDS: Ms. Walter?

MS. WALTER: I'm interested in the funding. It sounds like it's a costly program for the participants. How do they pay their expenses to attend and participate?

MR. KENNEDY: Because it is a day camp program, we are able to hold the costs down for the all-day sessions, which is the Gemini and Apollo levels, the cost is seventy-five dollars for the week. For the Mercury session, which is a half-day session, it's thirty-five dollars. So so far we have not had to turn anyone away for inability to pay.

MS. WALTER: Do you have handicapped participants?

MR. KENNEDY: We did have one handicapped student this

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year. It was the first time we have had such a request. We accepted the young man. It turned out to present some interesting logistical problems. We take the classes on field trips to facilities such as the Sacramento Peak Observatory, White Sands Missile Range and Holloman Air Force Base. The bus that we have is not equipped with a wheelchair lift, so we did have to carry this young man in and out of the bus a lot and it required a one-on-one type of participation, but we did have the staff and we do have the flexibility in this program to bring people on to accommodate these young people.

DOCTOR CLUTTER: You said that about twenty percent of the campers this year were girls.

MR. KENNEDY: Yes, ma'am.

DOCTOR CLUTTER: How many were minorities of the total?

MR. KENNEDY: I don't have the exact figure, but it comes to mind I recall at least two.

DOCTOR CLUTTER: I meant out of the total, not just the girls.

MR. KENNEDY: I'm sorry. I thought you were talking just the girls. I don't know. I don't have that figure, ma'am.

DOCTOR REYNOLDS: Would you like to follow through and have us get that figure? I think that would be useful. Perhaps you could send us that. We would appreciate it. Any other comments? Thank you very much.

MS. HOEBER: I was interested in how you communicate the

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existence of this camp and to what sorts of groups. What are your programs for making people aware of the availability?

MR. KENNEDY: We are preparing -- we have a brochure that we circulate. We have published an article in "Model Rocket Magazine" describing this program. That was the -- that was what was responsible for most of the increase this past year. We are planning to advertise. A lot of the enrollments that we get are by grandparents enrolling the grandchildren, so we are planning to take out ads in grandparent magazines. We are also attempting to establish a NASA teacher resource center at the Space Center, and NASA has offered to include our program along with the other similar programs that they send information out of, so we are pursuing, cooperating with NASA, paid advertising, word-of-mouth. Just about any program that we can that seems reasonable to publicize it.

MS. GUERRA: What is the length of the program?

MR. KENNEDY: It's five days.

MS. GUERRA: Is it an ongoing year round or is it just a summer?

MR. KENNEDY: So far it's just a summer. When we get our facility we hope to be able to expand to a weekend program. This past year we did conduct an experimental three-day program with the Albuquerque Public School System where they had -- our class from Albuquerque visited the Space Center for three days and received an abbreviated version of

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the program.

DOCTOR REYNOLDS: Thank you very much. Thank you, Mr. Kennedy.

Our next witness is Doctor Jack Cole, dean, College of Pharmacy, University of Arizona. Dean Cole.

DOCTOR COLE: Thank you. Good morning. My name is Jack Cole. As Doctor Reynolds indicated, I normally serve as the dean of the College of Pharmacy for the University of Arizona. For this I'm acting vice-president for academic affairs at the University of Arizona. I am also the immediate past president of the American Association of Colleges of Pharmacy. I am pleased to have this occasion to share with the Task Force my perspective on the concerns and issues related to opportunities for women, minorities and handicapped in the area of science and technology. I will, of course, focus my views specifically on the pharmacy profession and the pharmaceutical sciences since these are the areas where my experiences as an educator, researcher and academic administrator have been centered for nearly thirty years.

As a member, and as I said past president, of the American Association of Colleges of Pharmacy, and I will refer to that as AACP from now on, the national organization representing the seventy-four colleges of pharmacy in the United States. I will testify to the priorities and needs for allocation of resources to recruit, train and employ talented

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individuals, in particular, women and underrepresented minorities. The definition of which, for the purpose of my testimony, will include Blacks, Hispanics and Native Americans in the area of pharmacy practice, research and represented career occupational opportunities.

The issue of underrepresentation of minorities in colleges of pharmacy has been a problem that universities have been addressing for many years. In 1978 the AACP concluded that women and minorities were inadequately represented on pharmacy faculties, in graduate training and in undergraduate programs that awarded the bachelor of science or doctor of pharmacy degrees. The shortage of women in our BS and PhD programs characterized in the past is not a problem today. The percentage of female students committed to pharmacy schools has risen to over sixty percent in recent years. Until 1983, women were receiving approximately one-half of all entry-level degrees in pharmacy. Among the fifty students entering our College of Pharmacy at the University of Arizona this fall, thirty-six are women. By the year 2010, it is forecasted that women will comprise the majority of pharmacy practitioners in this country.

A US Department of Health and Human Services report published in 1986 by the Bureau of Health Professions, Division of Disadvantaged Assistance projected that the number of pharmacy students and pharmacists, projecting the number of

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pharmacy students and pharmacists in the future suggested the number of Black pharmacists will increase by thirty-nine hundred in 1985 to seventy-three hundred by the year 2000. During the same period, the number of Hispanic pharmacists is expected to grow from twenty-seven hundred to forty-one hundred. These data reflect increases of eighty-seven and fifty-two percent respectively.

If one relates these seemingly impressive figures to the total Black and Hispanic populations expected in the year 2000 and beyond, it would be obvious that despite the increase in minority practitioners there will be a reduction in progress made towards parity. The Black pharmacists, the Black population ratio would be less than sixty percent of the population ratio for whites. The situation with Native Americans appears to be even more dismal, although there are insufficient statistics to put any kind of comparison projection since the numbers are so few. In the case of handicapped individuals, we have the same problem with inadequate information from which to develop projections. While there were slight gains in the number of minority students who completed their professional practice or professional degree in pharmacy and go on to practice, this trend has seemed to have leveled off. The baccalaureate enrollment of Black students in pharmacy colleges peaked in 1978 to '79 with four minority pharmacy colleges, Florida,

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A&M, Howard, Texas Southern and Xavier University in New Orleans, educated more than forty-five percent of the Black pharmacists in this country.

It should be noted in 1985 forty-one schools of pharmacy did not produce a single Hispanic graduate, and twenty-six schools did not produce a single Black pharmacy graduate. Only six schools produced Native American graduates. Obviously something needs to be done. I believe one of the most important tasks is to raise the awareness of educators and academic administrators that minority representation is a current and ongoing problem, a problem which has seemingly lost the level of interest of the educational community in recent years. It is patently clear the federal funds alone will not completely resolve the problem, but they certainly will help. It is important that we appeal to our state legislators, and in the case of private schools who donate for help.

It is further important that we make our university and college administrations aware of this underrepresentation in our schools. Programs must be designed to identify very early in their careers those underrepresented minorities who might have an interest in pharmacy or of any other science field for that matter, and then to nurture them along through junior high school, high school and prepharmacy. Those who enter pharmacy school, the program should include ways to

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assist students in need of help by developing effective retension procedures. The recruitment and retension of underrepresented minority students are issues of the highest priority for attention and efforts of the American Association of Colleges and Pharmacy. The AACP through the Smith-Kline-Beckman Grants Award Program to pharmacy schools has contributed almost two point five million dollars since 1980 to strengthen academic programs and to help US colleges of pharmacy to meet their educational objectives.

Minority undergraduate, graduate programs or minority undergraduate and graduate student recruitment and retension programs have been and continue to be a priority funding area for this kind of support. In 1985, '86, six colleges of pharmacy received these awards ranging from twelve to eighteen thousand each. I have a list of the names in my remarks and they will be available for you later. In 1986 to '87 two more institutions were given an award to develop programs to encourage the recruitment and retension of underrepresented minority students. We are very confident that this support will result in an enlarged pool of qualified students to be considered for admission to these institutions.

While women have made impressive progress with enrollment and graduation from pharmacy programs, there are a number of areas where gains have not been substantial. For instance, access to graduate education in the pharmaceutical

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sciences for women and minorities appear to be very limited. Enrollment and data from AACP obtained for 1983 do show a promising upward trend in our colleges of pharmacy. They account for forty-two percent of all MS and nearly thirty percent of all PhD students that year, an issue related to women in pharmacy graduate training in their comparative underrepresentation on pharmacy faculties.

The 1983-'85 data indicated a total percentage of women on faculties was sixteen percent, and only -- of that sixteen percent, only ten percent in the basic pharmaceutical sciences. The prospects for Blacks, Hispanics and Native Americans access to graduate education is even less encouraging. Until 1983, two percent compared to 1978, the situation became worse with underrepresented minority students representing only two percent of the MS degrees, and one percent of the PhD degrees. Improving accesses to graduate education opportunities for women and minorities is another priority of AACP.

Among the specific actions taken by the association and its member colleges is recent initiation of the research participation program for undergraduate minorities and women. Developed in collaboration with and with generous financial support from major pharmaceutical companies, this program is an innovative means to encourage talented undergraduates opportunities to engage in receptor research activities.

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Awards are provided to students who have successfully met the rigorous review criteria. The determination of who receives this awards depends on satisfactory academic performance, interest in developing research skills and quality of the projects.

For the academic year 1987-'88 thirteen students were selected among forty-five women and minority candidates representing twenty-four colleges of pharmacy. This is the first stem. This joint effort between academic pharmacy and pharmaceutical industry will undoubtedly derive considerable benefits for both, as well as for the individual who has received the support and encouragement generated by this collaborative effort.

I believe the responsibility for correcting the imbalance of women, minority and disabled persons' representation in pharmacy and the pharmaceutical sciences should be one shared among the academic industry and the Congress. It would certainly be a compelling incentive to continue the joint efforts between industry and academia with encouragement and contributions from the legislative and executive bodies of the federal level occur. Matching funding and other resources to support the development of strategies with motivation recruitment and retension of women and underrepresented minorities would be a way to demonstrate this shared commitment. It is apparent that federal policy makers

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need to become aware that there are segments of science and technology making progress and contributions in this critical area. I believe pharmacy can serve as an example or role model where this has taken place, but we need your help to do even more. Thank you very much.

DOCTOR REYNOLDS: Thank you very much, Doctor Cole. Questions?

MS. BISHOP: It seems as though you are saying that the schools are producing the numbers, although not enough in terms of women and minorities. I would like to focus on employment. If you are pushing the numbers out of the schools, can you speak to the employment? Are there jobs out there? Are they getting jobs? You mentioned that we are underrepresented on the faculty. That may just be one area, but can you speak to the employment after college? What's out there?

DOCTOR COLE: First of all, you must understand there is a shortage of pharmacists in the United States. More so in certain regions, and this happens to be one of the regions where there is a substantial shortage. By the way, Bill Hadley, dean at the College of Pharmacy at the University of New Mexico is in the audience. He may be able to help me. We have no difficulty in placing any of our students, whether they be minority or not. As I indicated in my remarks, because in our college seventy percent, throughout the country

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over sixty percent are women, not only is there no problem in their finding employment, they are in extreme demand and especially in those areas where there is a desire for flexibility of hours. So that is not a problem at all.

MS. WINKLER: Mine is related to that. I also get a little suspicious when you see a lot of women suddenly going into a profession. I'm concerned about the salaries because you have seen this happen in journalism, for example. It becomes a female ghetto, and then the salaries begin to decline. Is this a really high-paying field compared to other technical fields?

DOCTOR COLE: Yes. In order to save time I left out some things. This profound change, that is the women in pharmacy, can best be attributed to several factors that make pharmacy such an attractive career choice for women. These include parity in salary regardless of gender, high levels of job satisfaction, personal esteem and economic rewards as well as flexibility in work schedule.

DOCTOR DANEK: What is the average salary?

DOCTOR COLE: Our pharmacy students who graduated from the college of pharmacy in May of this year started at a minimum salary of thirty-seven thousand dollars, and some of them got substantially more than forty.

DOCTOR DANEK: The women movement into pharmacy is not a function of men dropping out, but more a function of what the

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organizations have done to try to encourage them, is that what you are saying?

DOCTOR COLE: I wish I could take full credit for it, but if you want me to be frank with you, we are among friends.

DOCTOR DANEK: I'm curious about the magnitude. If you have thirteen women students who are getting undergraduate scholarships, the question I have -- out of forty-six applicants, the question is what is the potential pool of applicants and how much money was actually provided in that category?

DOCTOR COLE: Now you are referring to the graduate program, the two different issues. In the case of the graduate program --

DOCTOR DANEK: That was the graduate?

DOCTOR COLE: It is a graduate program. We don't believe we have a shortage at the undergraduate level. We have more than sixty percent. It's at the graduate level we are trying to do that, and that problem is aimed not only at women but minorities. We have thirteen women.

DOCTOR DANEK: I guess I'm trying to get a feel for thirteen awards out of what would be the maximum number of potential applicant?

DOCTOR COLE: This was only forty-five applicants from twenty-four schools.

DOCTOR DANEK: In the twenty-four schools what was the

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total population of women and minorities contacted applied for that?

DOCTOR COLE: Don't forget it was based upon qualifications and potential. I would suggest to you that the number is probably anywhere from one-fourth to one-fifth of what we expect in the future.

MR. FERNANDEZ: Doctor Cole, you just mentioned -- you named specific about Native Americans. Have you come up with any innovative ideas or recommendations you would make to this Task Force of how to improve the total Native American educational question?

DOCTOR COLE: I wish I could answer yes. It isn't because we haven't tried to do the usual things by going to the reservation. We have several students who have graduated, having programs with them. I think we have done all the things that we know how to do now. If you are asking me do we have any things that are working today, the answer is no. We have tried to give -- we try to do an ample good job of affirmative action in giving opportunities to underrepresented minorities in the college to give a chance for that sort of thing, and we try to work with them as much as we can, but I am not terribly proud of our success rate.

MR. FERNANDEZ: Could we conclude that this is a special case that needs further serious research and study to resolve?

DOCTOR COLE: It is -- I think each of the cases are

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special, as I say, and I think that each of them has their own unique problems -- not problems. I think Mr. Matthews said opportunities, and I think we have to deal with them in that case, but I know that we have to do what I said earlier and that is go to the lower levels, and we are doing now in the junior high schools. At least at the junior high schools, if not maybe lower, in trying to work with students at that point. That reminds me, which I never got to make my statement about H comp which I am terribly disappointed we have not been successful. Pharmacy has lost headway in H comp. We will put in our share and we are going to do that. We have done it, we can demonstrate it, but we need additional help.

DOCTOR REYNOLDS: One last question. We are really running into the time bind so I'm going to cut it short and ask Ms. Sabatini for the last question. If there are individual questions of Doctor Cole because of that stimulating testimony, perhaps you would be so kind as to provide a hall side conference for our commission members that wish to ask you further questions.

DOCTOR COLE: I am going to catch a plane in half an hour. We have to go right back. May I say something that I have presented not only my statement, but I also have included an article that I wrote on underrepresented minorities in our journal last year, and also the program in underrepresentation

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for graduate students minorities.

DOCTOR REYNOLDS: Give me your last name again from New Mexico.

MR. HADLEY: Hadley.

DOCTOR REYNOLDS: You will still be here, right, in case people have questions of you? Thank you.

MS. SABATINI: I just wanted to comment, this rosy picture is not as rosy as it's presented because the problem in the underutilization of women and minorities at the postgraduate level in science and industry and in the schools of pharmacy. There are a whole mess of people at the entry level, but the problem is, as Doctor Cole pointed out, in academia the amount of women and in the pharmaceutical industry is --

DOCTOR REYNOLDS: You keep pointing out a specific problem which is the failure, if you will, of women to enter academic medicine in all areas. That's pharmacy, academic pharmacy, academic medicine, academic -- all aspects of that.

DOCTOR COLE: Graduate programs, and as a result of that the access to industry becomes even limited. It's just that I couldn't get it all in in the time you gave.

DOCTOR REYNOLDS: You did very well. Thank you very much, Doctor Cole. Our next individual to testify is Mr. Robert L. Knutilla, district chief of the US Geological Survey and Water Resources Department.

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MR. KNUTILLA: Good morning. My name is Robert Knutilla. That's the way I pronounced it when I was in Michigan and down in Florida. Maybe here in New Mexico this ought to be Knutilla. I'm with the US Geological Survey. I'm the chief of the US Geological Survey, New Mexico District, Water Resources Division. I am within the Department of the Interior. What I would like to do this morning is give you a little information about our agency and some of the things that we are doing to enhance our level of minority participation within our division. Our office's primary function is to collect water resources data and undertake hydrologic studies to discuss the state's water resources, the studies of data collection for surface water and groundwater and the quality of those resources. As such, we are a scientific agency that evaluates the state's water resources to meet both the national and local needs.

In New Mexico we have a district office in Albuquerque, the subdistrict office in Santa Fe, subdistrict office in Alamogordo and one in Las Cruces. We have field headquarters in Carlsbad and in San Antonio. We have a staff of about sixty individuals in the district office, and forty individuals divided between the subdistricts and field headquarters. Because of the scientific nature of our work we have a large staff of hydrologists. The hydrologists have academic background generally in engineering, primarily civil

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engineering, in geology and in chemistry. We also have those backgrounds in mathematics, computer sciences and geochemistry. At times we may also have employees with backgrounds in biology, graduates in water resources management, environmental scientists, meteorologists and nearly any other academic field related to earth science.

In our support of hydrology, we have almost an equal number of hydrologic technicians. Technicians are primarily responsible for collection of data on stream flow, reservoir contents, groundwater levels and the quality of surface and groundwater. All of this is part of our basic data program or is input to hydrologic investigations. Some technicians within the survey have academic degrees in such fields as geography, forestry, biology and the like. Also many of our postgraduate -- many have a postgraduate academic training, but do not have any degrees. At least three of our technicians are currently taking classes at various state universities with the goal of obtaining a degree in order to become qualified as hydrologists.

Because of our somewhat specialized area of work we have experienced some difficulty in locating minority candidates to fill vacancies. By way of numbers, however, the following is a breakdown of our staff in terms of women, minorities and handicapped employees. We have thirty Hispanics on our staff. Three are classified as hydrologists

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and one is attending school to become a hydrologist. Our administrative officer and one of our computer programmers are both in professional series and are Hispanics. Other Hispanics include nine hydrologic technicians, eight hydrologic aides and three editorial assistants. The remainder include computer assistants, clerk typists and the like.

By the way, of female employees we have six hydrologists, one of whom is an assistant district chief and administrative officer, computer program analyst and an educator, all in various professional fields. Others consist of editorial assistants, computer assistants, cartographic technician, hydrologic technicians and clerk typists. We have one handicapped employee who is a deaf mute. The second handicapped employee recently retired because of medical disability, and we have one Native American.

In order to maintain awareness in the field in the areas of female and Hispanic employment, we are actively involved in the federal women's program and Hispanic employment program. We also use various appointments to hire part-time assistants and make them aware of the geologic survey and our work in the field of earth sciences. The one program in which we have had the greatest success in recruiting minorities is the geological surveys, MPES program, that is the Minority Participation in Earth Sciences. This

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program is targeted toward minority university students and funded by the director's office. The intent of the program is to provide minority students with hands-on experience in the field of water resources. This is to give them experience and hopefully interest them in earth science as a career field.

The students generally work on a part-time basis during the school year and full time during the summer and during school breaks. The schedule, however, varies depending on the needs of the students. Under this program we currently have students working for us that attend New Mexico State University in Las Cruces, the University of New Mexico in Albuquerque and Highlands University in Las Vegas, New Mexico. Highlands University, as you may know, has a student population that is highly -- largely minority. It has the second highest percentage of Hispanic students in the United States with sixty-six percent being of that background. One of the students under the MPES program at Highlands is continuing his graduate work because of the MPES program and the work that he has been doing for us on projects related to acid rain and forest management.

Another activity in which we participate and one that complements the MPES program is the annual Hispanic Professional Career Opportunities Conference. At this conference students, usually juniors and seniors, with a three point zero grade point average or better from universities

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throughout the state are invited. The students are generally in engineering, science, math and business majors. The students are told before the conference which government agencies or corporations will be hiring so that they may select those for interviews or for further information. As a result of this past year's effort, four students have been hired by our agency on a part-time basis. They are now being trained in water resources by these, and the opportunity for students to be considered for employment upon graduation. To date we have been very pleased with their work.

Some of the other things we have done to interest students in earth science include participation in science fairs, participation in school and participation in career days. This year we served as judges for the chemistry and earth science projects at the Northwest Science Fair at Highlands University. We also provided prizes in the form of certificates, guest speakers, maps and educational material to schools in the names of the winning students. The hydrologist on our staff spoke to classes in Tucumcari in recognition of their winning student at this year's earth science fair. We have also sent letters and geologic survey pamphlets to twenty-eight New Mexico high schools that have a high percentage of minority students, and in follow-up to that effort, we made presentations to science classes at Roy, Las Vegas and Los Lunas High School.

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Although our budget constraints have made it difficult for us in the past few years to hire new people, we continue to work to accomplish the goals of your Task Force. Three female hydrologists have recently been promoted to the GS-11 level and one has been promoted to assistant chief, GS-13. Two of the female hydrologists are also Hispanic. We are working with one Hispanic male so that he can complete his schooling in order to qualify to be a hydrologist. We actively support programs such as MPES in which we have seven students on our rolls and are given authority to hire some additional students. These efforts are expected to continue into the future.

To help us in enhancing the field of available candidates, we need to reach the young folks and we will need to reach them at an early age. It's hard for us taking kids out of high school and in college and interesting them in earth sciences. We need to reach the kids in grade school and in junior high. I think this would be a charge that I would like to make to the Task Force to determine ways to interest the young kids in the field of earth science. Thank you.

DOCTOR REYNOLDS: Thank you, Mr. Knutilla. Questions?

DOCTOR RIOS: Mr. Knutilla, the Department of the Interior, in particular the geological survey, has been active over a long period of time in attempting to attract minorities into the earth sciences. As a matter of fact, in the early

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1970's Secretary Rogers Morton appointed a commission to address this question, and Doctor Lou Kaiser, geophysicist with the department -- with the geological survey was chairman at that time. Can you tell us if this MPES is a long-term continuation of those efforts? It sounds very much like the program that existed in the early 1970's, and if so, can you tell us what the impact of those efforts have been over the long-term with respect to go the representation of minorities in the earth sciences.

MR. KNUTILLA: I think the program has been going on for -- it goes back to the early Seventies. I was largely involved with it when I was down in Florida, and I did have some statistics from our efforts down there on the number of students that we had brought in training on a part-time basis and the number of students then that got into the field of earth sciences or technical fields, I think the program was -- we are looking at a program in terms of trying to get more and more minorities in to attend the geological surveys, but a good share of those individuals were picked up into the industry. They picked those fields rather than us. I don't have the statistics on it for New Mexico here, but like I say, we have seven students on our rolls now that are involved on a part-time basis, and we hope that as our opportunity permits we can get them working with us.

DOCTOR RIOS: My question very specifically is in the

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early 1970's there were virtually no minorities in the earth sciences, and I realize that the people that were supported through the geological survey programs were free to go to other employment. Can you tell us what the trend has been in the four-year representation in the earth sciences?

MR. KNUTILLA: I think there has been an appreciable increase in representation of minorities. Geologists, chemists, computer-type people and a lot of those women in the higher grades of industry. Many of them are eleven, twelve, fifteen levels doing scientific investigations.

DOCTOR REYNOLDS: Thank you very much. We appreciate your testimony. Is that a Finnish name?

MR. KNUTILLA: Yes.

DOCTOR REYNOLDS: Our next witness is Ms. Louella Marr, director of the minority honors program at Luna Vocational-Technical Institute.

MS. MARR: Thank you very much. Madam Chairwoman, members of the Task Force and ladies and gentlemen of the audience, I am very pleased today to be here to testify on the minority honors training programming at Luna Vocational-Technical Institute. I will begin by telling you a little bit about our institute in Las Vegas. Luna Vocational-Technical Institute is the only vocational-technical school in northeastern New Mexico. The main campus is located in Las Vegas with satellite campuses in Santa Rosa and Springer, New

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Mexico. LV-TI serves an extensive geographical area that includes six school districts within the counties of San Miguel, Mora, Guadalupe, Colfax and Union. The service area is one of high unemployment, underemployment with minimal high tech training and employment opportunities in the high tech area. The population of the counties served is predominantly Hispanic.

Accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools, LV-TI offers thirty certificate areas. The departments include technologies, health, business, trades and industry, and additionally a developmental studies department focuses on adequate preparation of students in general and developmental education. Luna Vocational-Technical Institute with the support of the United States Department of Energy, Office of Minority Economic Impact began the minority honors training program and industrial assistance program in 1982.

LV-TI has been one of nine schools in the nation selected for funding for this program. The program is a scholarship and high technology, energy-related cooperative training program that is providing minority honor students with opportunities for training and employment with high tech energy-related industries and scientific institutions. The program has been extremely successful and has offered Luna Vocational a unique opportunity to serve both its student

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population, consisting of approximately eighty-two percent minority in New Mexico's growing high tech industry. The program has fostered a greater participation of minority honor students in high tech engineering related careers.

Since the inception of the program and at the end of the 1986-'87 school year, the honors program at LV-TI had provided over eighty scholarships to three hundred minority honor students pursuing high tech careers. Approximately eighty percent of these program graduates are now successfully employed in high tech occupations. It is a requirement of the program that students maintain honor status in their areas of study and also show some financial need.

The program has allowed Luna Vocational-Technical Institute to establish linkages and articulation with fourteen major corporations and scientific institutions in New Mexico for the purpose of relating educational training to the high tech industrial and scientific studies. It is also helping to provide a greater awareness of the application of technology to the northeastern sector of the state. The interaction in and input from industry that this program has allowed in helping to develop in state resources to help meet some of the work force needs of high technology, industry in our state and also our country. Through articulation and linkage efforts, these corporations are provided career opportunities for LV-TI students and assisted with curriculum development in high tech

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areas.

Cooperative education, training programs and specialized training programs have also been established which are allowing students to further develop their training and job skills. The cooperative effort is providing students with many job-related experiences, and is allowing them to apply their classroom theory to future employment. It is providing students with levels of technology and applicational skills that will be demanded of them by the high tech work force.

In seeking funds from the Department of Energy, Office of Minority Economic Impact for the 1987-'88 school year to continue this program, LV-TI sought to extend the successful program to other minority students. The program goals are to provide a high tech -- to provide jobs in high technology fields for minority honor students from low income, high unemployment areas, to meet the needs of energy-related industries developing training curriculum to fit their objectives and to encourage technology transfer from industries to Luna Vocational-Technical Institute.

The objectives include to provide scholarship assistance to at least fifty qualifying minority honor students every trimester, to create additional links with both high tech industry and scientific institutions, to improve Luna Vocational-Technical Institute's ability to provide quality graduates through increased emphasis on appropriate

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curriculum and certifications and fourth, to establish cooperative efforts with technology-related institutions in New Mexico.

Luna Vocational-Technical Institute, unlike most vocational schools, cannot concentrate solely on preparing students in job skills and vocational attributes. Instead, it has a dual role to perform. That is to provide training in preparation for the world of work, the skills and concepts necessary to perform functions on the job, and to prepare the students to live in a work setting, a work environment whose culture is different, unfamiliar and many times in conflict with the one in which they were born.

The minority honors training and industrial assistance program allows LV-TI to meet these goals by encouraging and rewarding academic achievement, by recognizing academics at an institution like ours. Training students to compete in today's work environment by offering them opportunities to work with an industry during this training period. Preparing students to participate in the environment of high technology by providing relevant curriculum, providing a realistic sense of motivation which encourages students to get higher goals for technology vocations and makes a visible impact on their growth and development. Providing expert consultants to help Luna Vocational keep current on industry needs and technology, and by giving students and faculty

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knowledge on the application of theoretical training to industry use.

To the Task Force on Women, Minorities and Handicapped in Science and Technology, there is a need for more innovative programs like the minority honors training and industrial assistance program at LV-TI. Programs such as this will help to enhance the opportunities for minorities to participate and contribute their talents to our state and our country in the areas of science and technology. LV-TI is grateful to the Department of Energy, Office of Minority Economic Impact and our Congressional delegation for their funding support of this program. We are also very grateful to the many industrial firms and scientific institutions here in New Mexico who have supported and cooperated jointly in this program. All this support has, indeed, contributed to our institute's mission of preparing students for productive employment.

DOCTOR REYNOLDS: Thank you very much. Ms. Bishop?

MS. BISHOP: Yes, I'm curious. What is the minority makeup of the school?

MS. MARR: It's eighty-two percent minority.

MS. BISHOP: How do you define minority?

MS. MARR: Minority includes Hispanic population. There is about a seventy-six percent minority, Hispanic population, about a six percent Indian population. The rest of the

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population consists of white, non-Hispanic.

MS. BISHOP: No Blacks?

MS. MARR: Very few. There are no Blacks presently.

MS. BISHOP: Is this a degree seeking school?

MS. MARR: It is a certificate granting institution. We are hoping to become an associate degree granting institution.

MS. BISHOP: What types of careers would one graduate into?

MS. MARR: We offer thirty different certificate programs in the areas of technologies, in the areas of health, in the areas of trades and industry and in the areas of business. A few examples are computer programming, secretarial, electronics, laser electro optics, a nursing program, a registered nursing program. Those are just some examples of our programs.

MS. WINKLER: Just a quick question I didn't catch. Is this a state institution, a private institution?

MS. MARR: It is a state institution. It is a vocational school in New Mexico, the only one in northeastern New Mexico. We serve six different school districts within four counties.

MS. WINKLER: So you are affiliated with the school districts rather than, say, the higher educational community? That's who you belong to? I'm just trying to figure out where you fit.

MS. MARR: We are an area vocational school. We are

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considered a postsecondary institution, and we are recognized by higher education.

DOCTOR REYNOLDS: Doctor Scadden?

DOCTOR SCADDEN: I have a question of clarification. You indicated the scholarships are offered to honor students. When you refer to honor students, are you referring to students coming out of high school? Is that where they are honor students?

MS. MARR: Depends. We allow the students to obtain these scholarships if they qualify from the last school they attended. It could be high school, it could be another vocational school, it could be a college. They come from a number of different institutions. We offer scholarshps for students who are already enrolled at our school who have shown that they are maintaining honor status, so they may be at our institution only one trimester and then qualify for a scholarship.

DOCTOR SCADDEN: Is there any type of program working with the high schools preparing the students for LV-TI, or is this just based upon the performance before they come in?

MS. MARR: We would like to say that we are working with all of the area high schools to promote this program.

DOCTOR CLIVE: You do monitor developments in high schools and that's what this question is based on. There is a phenomenon in many predominantly Black high schools wherein

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the striving, the academically striving students are often taunted for acting white by many of their peers, and I'm wondering if you have seen any similar phenomenon among Hispanic or Indian students?

MS. MARR: Are you saying for them, for example, to go on to college?

DOCTOR CLIVE: What I am suggesting is those who are getting good grades are taunted for, in this case, acting Anglo, betraying their ethnic heritage or is there no --

MS. MARR: I don't think so. No, I don't think so.

MS. FREEMAN: The question would apply also to young women who are discouraged from being -- from fulfilling their academic intellectual potential because it's not cute or feminine. Would this be the same kind of phenomena whereas a Black student or Hispanic student thinks it's not the popular thing to be a smart kid, or they have intense peer pressure to not excell?

MS. MARR: I haven't seen that problem. I would like to say that the age of our students is right around twenty-five years old, so many of these students participating are already at a vocational school, and it's offered them a great opportunity to enter the high tech careers even at this age.

DOCTOR REYNOLDS: Thank you so much. We do need to move on. Will you be available in case there are further questions from the group they could ask you personally? You are handing

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in your testimony?

MS. MARR: Yes, I have handed it in.

DOCTOR REYNOLDS: Thank you. You are doing very important work, and thank you for that very interesting testimony this morning. Our next witness is Ms. Katherine Harris Tijerina from the Indian Resource Employment Institute.

MS. TIJERINA: Thank you very much for having me today and allowing me the chance to testify. I suppose I should introduce myself slightly. My husband always reminds me for people who don't know me. I don't appear Indian. I'm an enrolled member of the Comanche Nation. I was born and raised in Comanche country, and that connection to a tribal society is very important to Indian people as they proceed into professional areas. Keeping that connection I think is a key to any successful program.

Briefly, I'm director of the Indian Resource Development Institute. Indian Resource Development is a statewide program funded by the State of New Mexico. It's appropriated by the state legislature. We are part of the university system. We are located down at New Mexico State University, but we operate with all the universities here in New Mexico. Before we get into the types of activities that Indian Resource Development engages in, and I will use the short of IRD for that. You are being passed around graphs and I wanted to briefly address the issue of where Indians are

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nationally.

As a part of our own effort at being accountable to the state, we tried to take a look at how New Mexico was doing in relationship to other states in the southwest, and we also looked at the national picture, and we were aided in this effort by the Department of External Statistics at New Mexico State. This is not our statistical work and it is not absolute numbers. What it is is a parity index that controls for population, and in my written testimony I explain it in greater detail. I hope you all get a chance to look at my thirty pages of written testimony which may be more than you want to know about IRD, but gives you a little bit more in-depth information.

First of all, if you look at just for Indians in college enrollment, you see that nationwide enrollments are declining from 1974 to '82. The US, which is the second line here, is in a decline all the way through, and that is true of all of the states in the southwest with the exception of Arizona and New Mexico, and keep in mind that the states in the southwest are ones with the highest -- for the most part, highest Indian populations, so this is very depressing statistical information, I think. The exceptions to that are the States of Arizona and New Mexico. New Mexico unfortunately started at the lowest point of any of the states in the southwest, but we have at least bucked the trend

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nationally and increased our enrollments, as has Arizona to a smaller extent.

The other two are graphs specifically for physical sciences and for engineering, and you see in both of those that the same is true nationally. The enrollments in engineering and the enrollments in physical sciences are declining nationally. We are doing worse than we have done in the mid-Seventies. Now, I find it interesting that, for example, in physical sciences that there has been some increase in, for example, Colorado has bucked its own trend for overall college enrollments to increase enrollments up to '82, at least, and in Oklahoma there has been an increase since '82.

DOCTOR REYNOLDS: Excuse me one second. What is your index on the left-hand side, please? Could you explain that to the group?

MS. TIJERINA: That's what I was saying was explained in great detail in pages one and two of the written. Basically what it is is it controls for population, and one would be parity with your proportion of the population. This is college-age Indian students compared to the Indian population compared to non-Indian college age and population. So as you can see, even with New Mexico making its significant strides in enrollment we still on the national trend are under parity and overall enrollment. Those, I think, are worth studying

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some more, but I would like to go on now and talk generally. I do hope -- by the way, I assume you all are going to be talking to NEPA, and perhaps also I would recommend Betty Vetter, if you haven't already spoken with her.

DOCTOR REYNOLDS: She is here.

MS. TIJERINA: Because I was very impressed with her presentations to NEPA in San Diego, specifically the fact that if you are looking at populations in the future within the next ten years, if you are a nice white engineering firm and you want to hire new engineers, hiring people of color is going to be a matter not of just following your affirmative action plan or of doing what's right, do good, but rather it is going to be practical because the qualified people are going to be the only ones available, because there's just not going to be enough of the mainstream population in those areas. That's assuming that we make the kind of strides that need to be made and overcome these wretched statistics on who is currently enrolled in engineering and physical sciences in the technical areas.

So getting back to the Indian picture, Indians are woefully underrepresented in the science and technical field, and that is getting worse, not getting better. In the State of New Mexico, because -- first of all, let me also bring to your attention that unlike other minority groups, Indians are governments. Indian tribes are actual government units within

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the United States, and because of that they also are land owners and have a lot of acres with natural resources that they own, but which in the past they have had been unable to develop for their advantage. The benefit to the development has not gone back to Indian people, it has gone into the non-Indian community, and so part of the reason that the State of New Mexico has funded IRD is because of the recognition that unless these resources are developed equitably and more efficiently it will hurt the economics of the whole State of New Mexico because there is such a significant natural resource base, and that tribes are not likely to engage in that development until they feel they began to exercise more control over that development, and that means having members of their own tribe who share their value systems who are scientific, technical and managers, and so that is the mission of IRD.

We are developing Indian people who are in the management, technical and scientific fields. We recruit Indian students into college. We help retain them while they are in college, and when we say natural-resource-related fields, we are talking about math, agriculture, business, engineering, all of the physical sciences and computer sciences, and those are the areas that we have been engaged in. Many of our activities you couldn't say are innovative. We do a lot of standard things such as recruit in high

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schools, summer programs, but I think that the way in which we approach those are often innovative, and the fact that we are a statewide program I believe is unique in the country.

For example, when we recruit in high schools we target those high schools with high Indian populations. We deal not only with counselors but with the science teachers, and we have good videos to show to the Indian students using Indian professionals in the specific area that we were recruiting from. We found that's been very successful. We also have an outreach newsletter which is specifically designed for Indian students at the high school level with them in mind which gives them a chance to feel connected to other students who are doing the kinds of things that we are encouraging them to do, and also is -- gives them a sense that other people can be successful who are Indians. Who don't need to lose being Indian to be successful.

In our summer program, IRD has a summer program that it directly puts on which is only a week-long program which is essentially an exposure to college. This is what college is like. These are the opportunities available for you. These are some of the things you can go into in and what the advantages of them are. We also send them through testing to give them a sense of what kinds of things that they need improvement for when they get back to their high school levels. One of the unique things about IRD is that we don't

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leave it at that. Often we take these students in at the sophomore level. We also fund then New Mexico's Institute of Mining and Technology, their summer program which is a more academically oriented program for the kids more in the junior year in college, and we also fund NAPCO, which is the College of Engineering Native American Program at the University of New Mexico here in Albuquerque, and their program is a bridge program from high school into college. So essentially what we have in New Mexico is a pipeline of students so that each summer they can go to a different program at a different university giving them different quantitative information and qualitative information which hopefully at the end of that process makes them more successful in school.

We are putting more and more emphasis in IRD on retension because we think retension is both cost effective in terms of dollars, but more important it's cost effective in terms of human life. If you minimize a person by having them drop out of school that causes a great deal of harm to that person, so we think it's an important investment to try and increase our retension efforts. The things that we do in retension include faculty advisors. One of the keys to good student retension is being connected when they get to college, and that means usually a faculty member, but faculty members aren't trained in advising, they don't do it particularly well so one of the things that we have done is we have gone out and

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actually trained faculty members in how to be more effective advisors.

Other things are a tutoring program which include a drop-in so that they don't have to ask for help so that they feel comfortable and welcome. They don't have to admit that they are doing badly, and we find that they are much more apt to take advantage of that kind of program in those parameters. We also have a study center designed just for the Indian students so that they can network with other Indian students and feel comfortable in a welcoming environment. We give a financial aid booklet which we distribute nationwide. We have gotten great demand for it nationwide because it pulls together all of the sources of financial aid that Indian students can apply for, and it is, I think, in great demand because it shows the increasing problems Indian students are encountering in putting together a financial aid package which will allow them to stay in school.

Let me just skip now to basically the fact that we do fund programs at New Mexico's Institute of Mining and Technology at the University of New Mexico. We visit with other universities throughout the state to tell them about what services we have available. We try also to tie back into the Indian community and the professionals there. For example, the business college at New Mexico State sponsors through IRD funding management training for tribal employees

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and for employees of Indian businesses and organizations. Similarly, agriculture does the same in the Indian livestock day, and those continuing connections with the community we find critical.

IRD is governed by an Indian advisory board which is made up of representatives of the tribal governments here in New Mexico, and we find that having that connection back to the community enables people to feel good about themselves, to feel centered and connected and yet still become professional people. The overall, I think, results -- you have to understand with Indians you are talking about very small populations nationwide, and in each of these areas I think as some of the other witnesses have testified, in New Mexico, we have been able to have eight hundred and eighty-seven participants which we find is widely successful. Those include high school students who are intent on going to college in the natural resources area, college students majoring in our area and graduates. Over fifty percent of the high school students and the college students are women, and the only place we fall under fifty percent is in our graduates. These are graduates over time in our areas, and in that we have seventy-eight men and fifty women.

DOCTOR REYNOLDS: Thank you, Ms. Tijerina. We are going to have to stop you now. We have run kind of overtime. We appreciate that very much. Do we have one question?

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MS. GUERRA: In looking at your charts, Ms. Tijerina, it's the one on the physical sciences, what do you attribute the difference? It seems that there has been an increase in Colorado and a very strong decline in Oklahoma. Is there anything in particular that you would attribute that to?

MS. TIJERINA: Well, I have to say that I think one thing that Colorado has going for them is AISES, who will be your next speaker. The National Organization for Americans in Science and Engineering is located in Colorado, and they happen to be very active with the Colorado universities there. Oklahoma, I think, has been somewhat relaxed. They have a very large Indian population, and they haven't put the time into it that they should have. In the past they sort of rested on their laurels, and I know that the engineering program at OU has recently not gotten its funding from SERT, which may have accounted for it in some part, but that I think that Oklahoma -- I share this information from people in Oklahoma, and I'm hoping that that will prompt them to be more responsive, and I have to say that New Mexico deserves a lot of credit. The state legislature for funding this kind of program and for having the insight to see the need for it.

DOCTOR REYNOLDS: Thank you very much. I need to write to you and find out what California is. We have the second highest Indian population in the United States.

MS. TIJERINA: The reason we did it because we were just

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doing this for a comparison for our own accountability. We were taking neighboring states that were more similar to New Mexico.

DOCTOR DANEK: You could do this for every state?

MS. TIJERINA: One could do that for every state.

DOCTOR REYNOLDS: We appreciate. It's very stimulating. Thank you so much. That's very, very helpful and most interesting.

I do want to recognize and welcome Mr. Robert Laughter who just joined us a member of the Task Force. Our next witness is Mr. Norbert Hill who has already had an excellent introduction.

MR. HILL: I guess it's difficult to probably put in context the problems, the challenges of AISES in the space of ten minutes, but I will try to talk about them and you can listen. I'm Norbert Hill, American Indian in Science and Engineering Society. Our national headquarters is in Boulder, Colorado. Our main goal is to increase the numbers of American Indian scientists in years in this country. Through our study we know where they at least started to look for Black and Hispanic engineers. We don't know where to start with American Indians. I follow your charge. We agree with Katherine and others would agree that this is no longer a minority issue. It's an issue of national interest in terms of who is the work force going to be and who is going to help

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pay our social security in the next generation.

Many of our concerns are similar to those who are underrepresented in science and technology. Some of our concerns and needs are different. American Indian people have unique characteristics which distinguish them from other groups and require special attention and understanding. Native people have turned over two billion acres of land in treaties hoping to result in peace and equitable treatment, but in exchange for tribal good will Indians receive only humiliation and loss. Even though American Indians were native to our country, it was not until 1924 we were made citizens of this country. Even despite being citizens, our people are considered wards of the government.

There are two hundred seventy-eight tribes in the lower forty-eight states and another three hundred communities in Alaska that are recognized by the federal government. My father used to tell me that people are here for three reasons. White people are here by choice, Chicano -- he referred to them as the original boat people, the wet white backs -- the Black people who are here by force and of course, we all know the history of the Black folks in this country and the people by right. Indians in this country have the fewest rights of all.

They have a lot of information is -- a lot of information printed is suspect and inaccurate. Even NSF

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publications are misleading in their justification and their justification for disseminating poor information that it is better to print something than nothing at all. It really does us more harm than good, and we seem to keep trying to explain bad information.

In reality American Indians, of course, have the lowest educational levels, the highest unemployment rates and the highest dropout rates of any economic group in this country. The mean income on the reservation is about ten thousand dollars per year, and unemployment skyrocketed to about eighty percent on some reservations. School dropout rates range from thirty-five to sixty-five percent for Indian youth compared to the national average of twenty-six point one. Suicide rate in Indian communities is epidemic. There's been an increase in the percentage in Indians' teenage suicide rates in the last two decades.

The reasons are they have failed to learn in school, lack of role models and disconnection from their own traditions. There's also an epidemic problem of alcoholism that pervades Indian communities. Seventy percent of the American Indians are genetically predisposed to alcoholism. It's an issue of biology, and issue of chemistry and an issue of science, not culture. Although our progress is actually tied to the success of other minority groups, my point is that if Blacks are stalled in progress, Indians are stalled as

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well. If the Black community sneezes, Indians get pneumonia.

By and large we are ignored, overlooked by most national efforts to effect positive change on behalf of minorities, and this has got to change. I'm convinced that nobody is going to save us but us. We need to make a plea. I'm pleased to see Howard Adams who is certainly very sensitive and Ms. Jenkins who has been very supportive to some of our efforts. I believe education is the common demoninator to the tribal Indian people. For us, education is more than a college degree or job, a house in the suburbs or young people attending private school. We have survived nearly five hundred years of contact with non-Indian people. Our people are rich in heritage, rich in natural resources and technology. More than two hundred medicines are included in the modern pharmacology from medicine people. Indians were able to understand complex mathematics prior the arrival of Columbus, which included the sun calendar and sun dagger and many more complex ways to understand a sundial. Over five hundred miles of irrigation were constructed -- before 25 BC were constructed by Indian civil engineers near Phoenix, and some of those canals are being used today. The original condominiums are in Mesa Verde and Chaco Canyon. Many other examples can be cited, but we have lost so much dignity and progress since then, and now we are trying to regain our heritage and our past accomplishments and step into the

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future.

As Katherine reminded you, we have now fifty-five million acres, which include thirty percent of the coal west of the Mississippi that's mineable, fourteen percent of the oil and gas, fifty-eight percent of the uranium in this country and eleven percent more worldwide. Ironically the land was given to the Indian because it was thought to be useless, but properly managed by technologically trained leaders the land can be developed and Indians can achieve self-determination.

I would like to make the following recommendations. That the Task Force initiate a study regarding the American Indian participation and concerns in the area of science and technology. The study should be done by Indian people or an organization that possesses a sensitivity and understanding of the Indian community. Hire more professional Indian staff of the National Science Foundation. The problem is internal as well as external. Very few American Indians have the access or opportunity to work at the national service level or other agencies that are represented here. The Indian desk of counselor could be established with the charge and responsibility and authority emanating from the director's office. Oftentimes special initiatives have good intentions but do not serve Indian people. Many times these initiatives support historically Black institutions. Very few dollars

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trickling down to the Indian community college.

In addition, most Indian students attend major institutions. Support of tribally controlled schools should be encouraged, but it should be recognized that the main pool of students are in major institutions. The Task Force should also recognize that Indian students are often a minority of minorities in major institutions. Indians simply get lost in the shuffle. There are few Indian professionals which have secured key positions, and they are overextended. We are less than one deep in all disciplines. We should make available more senior fellowships in research and science education as well as in science education. Community education programs should target Indian tribes in urban communities. You know, issues with museum traveling shows just to upgrade the quality of science, education and science literacy in our communities would be most helpful. The primary concern is the grades K through twelve.

I think the issue is very simple. Instead of increasing the students at the high end, you have to leverage impact in the lower end. Science and technological progress for students are critical and teacher training programs provide even more leverage to help students. We are currently making plans to establish a network of summer math camps. If you can't do math, you can't do science or engineering. Career doors for young minority people and Indian people are

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being slammed in the sixth and seventh grade. If you don't get those certain needs and fractions and decimals you will never get calculus. It doesn't matter what opportunity is on the other end it. The pipeline is closed off.

Working with teachers is important because if you can change the mind of a teacher and have them believe in their own institutions they teach in and they teach for another twenty years, you have a multiple factor from working with an individual student in the summer program of thirty increases to three thousand per teacher over a career. So I think it's important to target the minority community in science education and the in-service and preservice training of those teachers.

Agencies should find ways to extend the message of successful American Indian role models. There should be wide dissemination. There is a pamphlet which highlights northwest American Indians, "The Winds of Change Magazine," which I will provide to you. It's the only magazine in the country, a color magazine about American Indians, which focuses on science and technology. Underwrite the cost of regional conferences with the purpose of bridging access between various agencies within the American Indian community. Support other graduate students to be able to make representations. Establish programs for undergraduates, postgraduate students which target American Indians. The

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factor is reverse recruitment. There's no point in recruiting unable students or retained in the institution. Let's prepare them better so we can really increase the critical mass of minority scientists with summer internship opportunities on representative agencies or on the student reservations.

I'm disappointed that the committee does not have American Indian representation, or at least I do not recognize any of the people or names as being American Indians. I trust that the customer may advocate the concerns of the American Indian community. I further suggest you set aside dollars or target programs essentially for the American Indian community to help ensure progress. The success really depends on the will of the agencies and the individuals who are responsible.

I say in conclusion, my grandmother who graduated from high school in 1899, she said, "Going to school and getting an education are two different things. They don't always happen at the same time." To Indians, the universe is the university. It's been that way for eons. My brother dropped out of the University of Wisconsin because schooling interfered with his education. It doesn't take three hundred years to learn how to read and write or to do math and science. All people in this land, white, Black, brown, yellow, female, disabled can learn a great deal from native people. We have a culture and the heritage to share with all Americans. Our legacy is really the future. I pray and hope

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the American Indian people will play a significant part in the successful science and technology. I would appreciate your comments.

DOCTOR REYNOLDS: Thank you, Mr. Hill, that's very helpful testimony. We especially appreciate the fact that you have given this Task Force concrete recommendations. My first name is Quinetta, which is Cheyenne. I regret to say I am not Indian, although I spent the first four years of my life on Indian reservations. My parents were educational missionaries at that particular time. You pointed up our shortcomings very accurately, and most kindly and most pointedly. Do we have some questions from the commission members? I want to start this way and go around so everyone gets a chance. You first and then Mr. --

DOCTOR ADAMS: Norbert, I assure you that since you also inaugurated me as an American Indian and since I have been to a couple of pow-wows I will try my very best to represent you. I wish you would share with us a little bit about what you-all have been doing with teacher education. I think some of the things that you-all have been doing in that particular arena might be germane to what we are talking about doing and because it leverages the larger community.

MR. HILL: We trained over seven hundred teachers, seven hundred fifty teachers in the last several years. One is training teachers to believe in their own institutions. They

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don't believe in their own institutions. We got involved with science fairs, getting kids' hands dirty with science and really trying to get actively involved. The kids were okay. It's the teachers. The teachers are intimidated by science, and we were able to get fifteen thousand kids involved in science fairs and in one small Indian School in the State of Washington we had seventy-nine kids out of eighty who participated in the science fair. Four of the six judges are Indian role models. The kids taught seventy-nine different science units to each other, which a teacher could have never done, and so what we did was try to inspire a variety of schools.

We are no longer in the science fair business, but seventy-five percent of those schools have institutionalized science fairs as part of their curriculum. We are also involved in writing curriculum through the help of the National Science Foundation, teaching science, teaching methodology, integrating culture, field testing currently in schools and disseminating it throughout the country. So I think it's important to remember the past, trying to retain ancient traditions and now discuss a new way of learning to teachers in school.

MR. FERNANDEZ: The bulk of my question, in New Mexico do you know what the actual numbers are of baccalaureate degrees until 1987?

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MR. HILL: No, sir, I don't. I don't have the data in front of me. The problem with American Indian data, I mean, it's terrible, and you really have to look at it carefully because there are twenty million people in this country claim to be American Indians. One point four can show you papers that they are recognized by their individual tribes, so we have people who skew the data. They know they are Native Americans because they are born in Cincinnati, and therefore, they really are not. They are not American Indian people. I would sense that there would be more Indian people in New Mexico that would watch that kind of thing, but we all look like we stepped off the nickel. It's a very difficult identification problem.

MR. FERNANDEZ: A comment for the record. I think this Task Force needs to work on statistics that show output-input ratios from colleges because we get into that dilemna of saying we are doing great, man, but we don't retain them, we don't graduate.

MR. HILL: Our dropout problem is not in high school, it's the junior high level. In measuring the data, the ATC scores, the live scores, by the time the kids get to the senior levels to take the test, only the more academically inclined are left or at least survived it.

DOCTOR REYNOLDS: That's a very important point because we have those data for California which I will share with the

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commission, and define American Indian student, Native Americans that come to the California State University, graduated at the same rates as do white students but the trick of it is the very, very high dropout rate at the junior high and high school levels have really pulled the pool down to such a low level that one has a very different phenomena. So it's an important point. Very quickly and then we need to move on.

MS. WINKLER: You may have already given your answer to this, but I wanted to ask it in a different way. We are hearing more and more people talk about the need at the elementary school level particularly for good training, good grounding. I wonder if you could talk a little bit about your sense of what the problem is at that level, and maybe given some good ideas about solutions. Maybe you have some others.

MR. HILL: The kids are curious when they go to school. They want to learn more, and I think that if we can nurture their curiosity, nurture their quest for learning, their logic and their problem-solving skills at an early level it wouldn't be as great a challenge to recruit them in the areas of science, engineering, whatever. It's not ability. We are finding it's attitude, and somewhere the attitude is very young. We also have very small schools in rural isolated areas that don't have science or math departments, and so what we do is end up going to college and making up high school.

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You don't survive at Stanford or Cornell or Wisconsin, Colorado, University of New Mexico in that way, so we have to really improve the quality of what kids get early on. I think the numbers will work itself out later, but it's a long-term investment. It's not a band that we try to place on the educational system. I think we have to look at it as one of national interests that will affect everybody.

DOCTOR REYNOLDS: Thank you. Mr. Oaxaca?

MR. OAXACA: Two things. One, this Task Force is most interested in getting recommendations from you as to who you think would be more effective to be on Task Force both from the private sector and public sector.

MR. HILL: I would be delighted to submit those names to you.

MS. OAXACA: Number two, have you as you go down this path of trying to solve it, monumental problem that the nation has, have you considered tying into programs like MESA and PRIME and then maybe have a subchapter that ties into the Black Engineering Students Society, the Society of Hispanic Professional Engineers, or those that already have an established intrastructure as a mechanism to bootstrap the very difficult problem of forming the math departments or nonexistent math departments?

MR. HILL: As a population, as a group of people we can't afford not to work with anyone, and I'm very aware of all

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those programs. I work with a lot of Black organizations. Unfortunately, I think we have over forty colleges, MIT to Stanford to Montana and Arizona. We are involved with NEPA, precollege programs, the college programs, and frankly, I think we are doing better than the Hispanic groups. I would be glad to work together with them.

MR. OAXACA: We are having more babies. We are going to get you in sheer numbers.

MR. HILL: They didn't bring both so they are out of their good-looking attributes.

DOCTOR REYNOLDS: Interesting, though I am going to move on to the next person. Thank you so much. Our next witness is Lieutenant Governor Paul Shattuck from the Isleta Pueblo, Southwest Indian Polytechnic Institute. Is he here? He's not here. All right. We regret that. We will move on to then to go Ms. Sheila Tobias.

MS. TOBIAS: My name is Sheila Tobias. I'm the author of two books on mathematics avoidance and anxiety, of more than fifty articles. My book of -- the second book will be out in months dedicated to college-age students who have decided never to take another math or a science course again, and the next piece of work I'm starting, which will eventuate in a book, is called "What Makes Science Hard." Still, I'm an outsider. I'm not a trained mathemetician or a scientist and even as an educator, and I position myself as a feminist

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critic of mathematics and science education and an advocate of people like myself who could have but didn't take any science or mathematics in school.

Fifteen years ago I became interested in why otherwise intelligent, high achieving students avoid math and science. I was disturbed, as you are, by the importance of this for the nation, manpower issues and also by equity issues, and particularly because it was a disproportion among those avoiders of women and minorities. I found that if you ask the professionals about this question, why do otherwise intelligent students avoid science and mathematics, you got a very skewed response. The professionals I interviewed thought that these people were dumb. Dumb in math they would say, dumb in science or worse yet, lazy, and I think the very first point I want to make rather strongly as we have to confront you, the Task Force, I the citizen right up front, the elitisms in mathematics and science and sometimes a thinly veiled contempt among the practitioners for people who don't think exactly the way they do.

Striking out on my own, I hired a math instructor. We were focusing on mathematics at the time and a counselor, and we went out to interview in depth the science and math avoiders to find out what it was that bothered them about these fields, and we discovered that they were hostile. They were fearful. They were alienated from subjects that ought to

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have been central to their studies, and so I proposed an alternate hypothesis to counter that of the insider that these students were not dumb, not even underprepared, but that they are different. They have had different past experiences in their encounters with mathematics and science that have changed their attitude, and so my second point is that they may need different points of access to these subject matters.

You may be interested to know my avoiders showed lower levels of confidence, little trust in their own intuition, less able to diagnose their error patterns, less comfortable in these subjects, less risk taking and sometimes very nervous about being too good at math or science because it contradicted their gender or racial self-image. So they were really in a double bind.

The objectives of our interventions were to find ways of seducing these young people, and some of them were postcollege age, by the way, back into science and mathematics. We offered them this alternative view of themselves as anxious or alienated rather than dumb in math, and then went one on one in group counseling. We offered them out of classroom experimental experiences in math and science, picking them up where they were and taking them as far as we could, but the goal was to get them back into the mainstream. One piece of data might interest you. We worked with adults ranging in age from eighteen to fifty. Most of whom began

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uncomfortable with division of fractions, although they were adults, and in eight months got them to calculus readiness. That is, we found they were able to move at a very rapid rate because they were drawn to sophisticated language and concepts.

Since the mathematic era I have turned my interest to a science avoidance and alienation and failure, especially among those high potential students and here, too, I find a disproportion of American women, minorities, Hispanic, Black and handicapped. At the bottom of what makes science hard I have developed a technique that the Rockefeller is funding, I invite professionals of French and Spanish and law and nonscience to sit in an experimental course in science, that is artificially constructed science teaching experiences, and get them to try to grapple with the information and to write reports to me as to what is making it difficult for them.

The reason is my goal is to force the insiders, the pedagogy, the teachers of science to pay attention to what men and women who are their intellectual equals are saying to them about their pedagogy. They cannot dismiss these critics as dumb or lazy. I began with these two examples because this experience is a challenge to some of the insider's views as to how to increase the success rate of women and minorities in mathematics and science.

My first challenge is -- the first assumption I

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challenge is that a complete and a correct understanding, the full etiology as it is called in psychology of mathematics and science avoidance and failure needs to be in place before any meaningful interventions can take place. There is a body of opinion out there that says we must research causes of failure into the next century before we do anything. It's my experience that almost all intervention succeed, as you have been hearing this morning, at least in the short run and most don't have continuous funding, so we can't even tell you if they succeed in the long run. The reason they succeed, in my opinion, is that the usual homogenized rigidity of science and math is replaced in these experimental situations by something more flexible and more various.

In other words, it doesn't matter what you do as long as you do something different, and students, even avoiders, respond positively. I have a second reason for being skeptical of this cause research. Research into causes of math and science avoidance and failure is very often skewed, or incomplete and therefore, counterproductive in changing people's attitudes. The researchers tend to ignore significant intervening variables, like social attitudes or self-image, and they overplay biology. They come to bizarre conclusions like, for example, those of the much quoted Benbo and Stanley who have done more to hurt women's self-interest in pursuing math and science than any other single event in

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the last several years. They came out with a notion that there's a male math gene that predicts ability in mathematics, and they find correlations between math ability and adolescent acne in young males. Anything, in my view, that suggests that a built-in mathematics is in acne you will do terrible by hard work is counterproductive. Even though I'm interested in truth, I would put that truth on the shelf if it turned out to be true.

I'm also skeptical about the short-term usefulness of experimental research in education. That's the kind of intervention where you have control and a very careful design. Definitive findings are too close in coming and too inconsistent for rapid change that minorities and women really need. It seems to me far better to provide more and longer term funding for interventions that can be heard about this morning, to try a number of types of approaches and a variety of classroom settings and then retrospectively inquire as to what seemed to work and why.

The second assumption that I do not share with the experts is that any cure or intervention must be administered during the earliest school years. Notice I said must be administered. Obviously some could be. There is a notion out there that pupils and their teachers will never be able to undo or deconstruct an inadequate or improper foundation. I think this analogy is badly drawn. In our experience working

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with college aid and adult men and women, Anglo and minority, we found that a successful turnaround in attitude and performance in mathematics takes place quickly and at any point in the life cycle. Moreover, once that turnaround takes place, the learner rapidly recovers lost momentum and with far less effort than the first time and makes up for his work.

That was the example, our middle town group. Even people who long ago gave up on on themselves in relation to mathematics and science can be recaptured and trained at anytime. They all agree it would be more efficient to have done it earlier, but we find we can do it at anytime. Therefore, the funding agency sometimes exclusive pathological and curriculum improvements in the later grades is, to my mind, misplaced, and the third criticism is that we not think only about creating professionals out of these minorities and women -- I'm about finished -- but rather and I do know the MESA program and I think some of those are excellent, but that we consider the importance of general technical education for minorities and women in whatever field they major simply because of the the needs of the nation and of our citizens.

Another book I have written that Ms. Hope knows about, demystifying the technology of defense policy, and I find very important for people to understand, whatever they need to do that. Thank you.

DOCTOR REYNOLDS: Thank you, Ms. Tobias, for that

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stimulating testimony. Questions?

DOCTOR JENKINS: Just so fascinating. I want to thank you for your testimony. I wondered if you had done any work directly with the National Education Association, with the AFT, American Federation of Teachers or with the women bureau, the Department of Labor who have training vocational monies and so forth and so on to easily retrain teachers, adults and others.

MS. TOBIAS: I haven't received any of the funding. The funding for the math anxiety project was federal. It was mostly postsecondary education, and in my prepared remarks that I will distribute to the chairman I have recommended that you look closely at that model for funding. It was designed to filter out what I call the greedy. Provided very low or no overhead to practitioners and innovators so that the money -- and my first funding was thirty-eight thousand dollars, went directly into staff and support. When we did this math anxiety research work we found that our best customers were those returning to school at the continuing education level. The least responsive were teacher training programs, but I do think there is room for training and reduction of anxiety and alienation among elementary teachers which answers your question.

MS. WALTER: I couldn't agree more with your conclusions. I'm interested, though. You will start out your presentation

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by denying your technical training.

MS. TOBIAS: I have no formal technical training. I have learned all the math and science I needed to know as an adult.

MS. WALTER: You studied about this, but did you try it yourself? I'm just interested in knowing whether you tried yourself. Do you not feel that you have technical training now.

MS. TOBIAS: I don't think anybody would call it technical training, but I'm competent to learn. Let me give you my definition. The opposite of math anxiety is math mental health, and I define math mental health as the willingness to learn the math or science you need as you need it, and the new book that I have just completed is a romp through microbiology and sociology and business and economics in order to show students how useful this material is, and I have frankly had to learn it as I went along.

MS. WALTER: Would you feel comfortable to go back and try it on an official --

MS. TOBIAS: To attend class? Yes, I have done that incognito. I can't go to school at our university setting, but if I am out of town I sit in on classes. I am very comfortable now with subjects that once frightened me very much.

DOCTOR JENKINS: Can a list of your books be shared?

MS. TOBIAS: I have something.

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MS. BISHOP: What I am hearing is an area we all know that we need to focus on, or at least I think, but that has to do with teacher preparation, and I sense that the anxiety that certainly goes to the student obviously comes from the teacher who is probably not necessarily comfortable with teaching science. I know down in the lower elementary levels you have got a teacher who teaches a variety of subjects. Have you looked at the area of teacher impact, I guess, on the pupil at the lower level to see if there is another way in which we can approach science? I happen to believe that sometimes a teacher can be all things to all subjects, and if you are trying to motivate kids at a lower level we may need to look at another way in which teachers should be trained, either a teacher to do nothing but talk about science or something. Have you looked at that area?

MS. TOBIAS: I will review for the lower levels that there is very often a discomfort on the part of the material in presenting material that she hasn't studied or he hasn't studied in depth, and I will come back to that, but at the higher levels what you have are people who know their science and mathematics and the attitude problem is the one I referred to very broadly and with contempt and also the unwillingness to consider the possibility that there's another way of access to this information. That's why bringing these professionals of French and law into the physics class as I do around the

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hall, salutory for the attitude change, because you cannot deny the value of the comment from somebody who is your equal.

I called the program peer perspectives on science because these people are peers. They are at the level you are talking about. There's been a variety of suggestions, a number of them to provide formalized initial presentation and to use the elementary teacher as the drill or the reviewer, and the formal presentation would be provided either by an expert or by a video or by some computer assisted being so that there would be some standardized and absolutely reliable initial presentation, but I'm not technically skilled to comment beyond that.

DOCTOR CLIVE: This is not a facetious question, but I want to make sure you are absolutely sure that your hard scientists are really taking your French and law professors and so on seriously because my sources tell me that hard scientists tend to regard anything beyond hard science as not serious.

MS. TOBIAS: That's a very good comment and it is part of my goal, I guess, to bridge the two cultures and to demonstrate the accuity of the humanist perception, because when I will quote these comments back to the science faculty as colloquy, they are too intelligent not to recognize a good idea, and so I very often do get a positive response. Whether they integrate it into their pedagogy, I cannot of course tell

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you, but there is a very good response to the perception, whether it's about the demonstration or about the use of notation or whatever. It's as specific as I can make it.

MR. FERNANDEZ: Just a comment. It's very refreshing to hear you say what you did about the period of intervention that can occur at anytime. However, I think in the areas of minority education and the history we have of failure that we can't ignore the fact that it has to start way back at preschool and elementary school levels, and the positive reinforcement that leads to success in science and technology has to be the basis.

MS. TOBIAS: I can't disagree. It's really a matter of making the one exclusive of the other, and I refer you, since we are the host partly of Kirtland Air Force Base, to the fantastic job of technology training that the United States Armed Forces did at the beginning of the second World War, where of necessity they took people who had almost no prior math background, below seventh grade, as you know, and got them up to speed, and if it could be done in that kind of an emergency and if we call this an emergency, why can't it be done again. Let me end with one anecdote. We have been talking or dimly in the background have been the Japanese this morning who seem to be able to go produce the right proportions of professionals in technology in a most homogenous population. I'm sure you know, but in recent years

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during a study of under performance of Americans in mathematics compared to the Japanese counterparts, the psychologists went over with the measurement team and interviewed parents, teachers and students themselves and found the following, which I tell wherever I can because it tells us a great deal about what's wrong here.

Japanese children, their teachers and their parents believe, rightly or wrongly, it's ideology, that the ability differences between them are very narrow. Likely to be very narrow in math and science, and the difference between success and failure is hard work. American children, their teachers and their parents believe that math and science ability differences are very broad. There's an enormous range of ability differences in that hard work doesn't make a difference, and that to me alone is the source of so much of our difficulty, and all our interventions really did was to try to blast open previously firm knowledge about where these people stood on an ability continuum and make them consider the possibility that coming back into math and science, working hard would bring them back up to speed.

MR. REYES: Thank you. We have heard Mr. Hill talk about K through twelve as being the hardest impact, and some of us firmly believe and we have been hearing it that's where you impact the students and get them motivated. You mentioned one thing that's very controversial. You mentioned the teacher

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reeducation is the least -- where the group has the least response. I would like to see that data if you have it in your written report because if you have teachers in place right now and this is where the younger teaching begins, if they are afraid of math and science and they avoid that, those kids that are bright, willing and want it can't have it because the teachers don't know it, and what I am saying here is if those teachers are that segment, as you said, of the teacher reeducation aspect of it is where you get the least response, you obviously can't write out all those teachers and bring in new ones that are up to the task, or feel at ease with math and science, so I would like to see some data. I don't want to take the time here, but I would like to see some of your figures, some of the data that says that that group for reeducation is the least responsive because that may be something we need to go and give them a dose of medicine or something.

DOCTOR REYNOLDS: Thank you so much. Also you gave us a note of hope, Professor Tobias. Thank you. Next witness is Doctor Julie Haynes Lutz from the Program in Astronomy at Washington State University.

DOCTOR LUTZ: I would like to thank you very much for having me here. As a professor of astronomy, I teach, do research and do public and professional service of all different kinds. Over the years I have had an interest in

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women in science, engineering and mathematics. I expected when I entered the field that there would be this great tide of women coming in behind me, and that certainly has not materialized. In fact, we are even thinking about holding onto the numbers that we have in some of these areas, and over the years I have done things. I speak at conferences, attend workshops, and talk to a number of women, both adult and at the junior high and high school stages, and increasingly became concerned about what was happening before junior high. In other words, the K through six level.

I also noticed -- I speak quite a bit in public schools and in the Washington State University Planetarium. What I was not penetrating through my thick head that it was mostly little boys that had their hands up and curious and asking questions. That's not right. I'm sure the girls have questions. Why aren't we asking them? At the same time, my colleagues at Washington State, some people in the College of Education have done some research on what gets taught and what does not get taught in the elementary schools, and they found that it was likely in some cases that physical sciences topics would be skipped, biological sciences would be taught in reading and et cetera, but if you ran out of time it was more likely that you were going to drop the physics or the chemistry topic.

Another thing that I have learned more recently

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that I think is indicative as to what we were seeing is that while many teachers, something like eighty-five plus percent, feel comfortable teaching English, language or reading, only fifteen percent feel comfortable teaching physical sciences and feel prepared to do so. That isn't a very serious problem, so we decided about three years ago before we really had all our information to go where angels fear to tread and to try and improve the situation in the elementary school area. We chose to do a project that was a preservice project. In other words, teacher training, because for one thing, you have the people on campus and you can analyze what they are doing and have them write different courses. We developed a proposal and got it, if I remember, through the National Science Foundation. This was a group that included people from the division of sciences, physical scientists and people from the college of education, and we designed our projects such that while we wanted money for development, it wasn't such a dislocation in the way that the university operated to offer our project that it wouldn't be able to be continued -- continued funding.

What we did was the following. We developed a one-year sequence of courses in physical sciences for the elementary majors, and there's something very special about these courses. They include one semester of astronomy slash physics and one semester of chemistry slash earth sciences, so

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for example, in the astronomy part, which I teach, I have approximately seven weeks and I don't attempt to cover all the astronomy. I attempt to hit basic topics that are related to things that those people are going to get in the elementary curriculum. I haven't tried to do that a hundred percent because I think you have to have a little bit broader knowledge than that, but I think it's really important that teachers know, really know things that they are going to have to communicate to their students so they have the confidence to do so. So my astronomy part, for example, is slanted towards phenomena in the sky, the planets, things like that rather than try to cover the whole universe in seven-and-a-half weeks.

And as far as our lectures on -- I think there's all too much lecturing note going on both in the college and even in the schools all the way down to elementary schools. We don't want the students to get the idea that you just sit there and spoon feed science on your students. In our lectures it's a three-part lecture, one credit per course. We often pause for discussions or we use this concept of wait-time where we present something and have the students discuss it and asking questions and ask themselves questions. So we try to get away from just a traditional science lecture-type of thing.

In the laboratories, rather than offer sort of a

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classical physics lab where you got a lab and there's expensive equipment that you are never going to see again, we have tried to as much as possible in some areas, it's more possible than others, to have the laboratories in a room that looks very much like an elementary classroom. You know, with nothing in it and it's crowded and et cetera, et cetera. There's only a sink, and we do chemistry, we do astronomy, et cetera, in this setting because that's the setting that the teachers are going to have, and we have tried to do things with inexpensive materials that can be bought in local stores in a small town. What we try to have is that teachers in, say, Wahkiacus or Tukwila or other small towns in Washington could get the bulk of their materials from the grocery store, from the hardware store, maybe from the neighborhood drugstore, and be able to offer things in their classrooms.

Now, traditionally this had been the purview of methods courses in the college of education. We do have a science methods course that goes along with this to sort of reenforce the principles of theory from an educational point of view, and so forth, but frankly, you need a lot of practice. You need all the practice you can get in order to offer these things. If you are an elementary teacher who is trying to learn all about reading, all about social studies, it really helps you to have these demonstrations in both the methods course and in your laboratory and in your science

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laboratory. This shows the students that science is accessible because it is hands on, and I think another thing we are doing is that I recently learned also that there's been a decline in the amount of hands on that's done in the elementary classroom, so that's become in many cases woefully small.

What we hope that by having the teachers do all this stuff that they will be able to reproduce some with their students and get their students involved in science. We are very satisfied with the results, but we only have limited data. We test their attitudes beforehand against the control group, and we do see some improvement in their attitudes compared to the control group after we have had one or two of the courses in this sequence. Well, that's kind of a so what, I will be interested in what those people actually do when they are in the field five years from now, but what they are telling us after they come out of the courses, they do feel more confident, more informed about how to teach physical sciences.

Let me make a philosophical comment that follows up on Ms. Tobias, and that is that about the attitudes in science. Last week I was a keynote speaker at a science fiction convention, and one thing I did while I was there was to serve on a panel about why would you want to be a scientist. So we were all seated around with people in green

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suits and spangles and makeup discussing this, and it turned out that many of those people had been discouraged, and what they were saying was that it was because it was like science was a series of hurdles and they were very abstract hurdles. I think we have to personalize it more to tell people that they can do science to encourage them in any way that we can, starting with the elementary level and going through college. Thank you.

DOCTOR REYNOLDS: Thank you very much, Doctor Lutz. Questions from the panel?

DOCTOR CLUTTER: You said at the beginning of your testimony that you found that in talking with elementary school opportunities that it was mostly boys who asked questions. Have you ever discovered any reason why that was true?

DOCTOR LUTZ: I think generally in elementary school classes a certain relatively small percentage of the students get most of the attention, and that those are generally little boys. If you would pick the top six of the majority they would be little boys, and I'm not sure that that doesn't come from most subjects, not just science, but if you look at the way teachers behave in class, this is other people's work, not mine, teachers do seem to think just a little bit more that the girls would be more successful in the language arts, social studies and the boys would be more successful in math

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and science. This is attitude of the parents, and I have come to think recently that the attitudes of parents even through teenagehood when they turn into monsters is very important, that the parents believe that their little girls will not be as successful, will not be as good in these subjects, and I think that that is an influence.

DOCTOR REYNOLDS: Doctor Clutter?

DOCTOR CLUTTER: I might just add in the educational categories, high school through college, male students occupy -- it ranges in the study, but sixty to eighty percent of all classroom verbal time. They take up most of the discussion time in class. They speak more often, they are called on more often.

MS. HOEBER: Would that lead one to a potential conclusion that at least for purposes of communicating some topics it might be sensible to have single-sex classes?

DOCTOR REYNOLDS: Incidentally, and we can talk about this another time when the group is meeting, we are considering that or the women in mathematics issue of going back to single classes on a pilot experimental cases in K through twelve in California because of that.

DOCTOR LUTZ: I have a comment on that, and I don't know that you necessarily need to go to single sex, but young girls seem to react better to more hands-on stuff and also cooperative rather than lecture.

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MR. FERNANDEZ: Are you tying any of your research into university curriculum for education or reeducation?

DOCTOR LUTZ: You mean like in-service workshops and things like that? Yes, now that we have developed to do the laboratory stuff, we can see where a lot of this would be good for in-service things, but we have not offered any in-service yet.

DOCTOR REYNOLDS: Thank you very much. We really appreciate your coming to speak before us and your interest in science. Our last scheduled person to testify this morning is Nina Kay from the research program at Lyndon B. Johnson Space Center. Doctor Kay?

DOCTOR KAY: Thank you, Madam Chairperson, members of the panel and members of the audience. Well, I hope you all don't have information overload. I will try to not bother you with the details, but to give you the broad picture. To introduce myself, I am Nina Kay for the research project being conducted by the Center for the Advancement of Science, Engineering and Technology which we call CASET of Huston-Tillotson College, Austin, Texas, under contract from the Department of Defense, DOD, with support from the National Aeronatics and Space Administration, NASA, Johnson Space Center and the Department of Labor with technical oversight from the Army Research Institute for the behavior social science. The project is entitled "A Study to Determine and Test Factors Impacting on

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the Supply of Minority Women Scientists, Engineers and Technologists for Defense Industries and Installations." We use the term SET's, S-E-T's to refer to those occupations which are quantitatively based, the physical sciences, computer science, earth sciences, engineering and mathematics.

There is some difference in the scope and focus of the CASET study and the purpose of this task force. The CASET study has to do with human resources, nonaffirmative action. Secondly, the handicaps are not included in the scope. Thirdly, our purpose is to encourage the underrepresented minorities, who are American Indians, Black and Hispanic. Asian Americans are, in fact, overrepresented in these quantitative careers in the study. The funding of the study reflects Secretary of Defense Weinberger's early recognition of the problem and his willingness to have the Department of Defense take a leadership role in the question of America's technological age, possible loss or erosion, because all segments of our population were not being utilized.

We are also empowered to give policy options, suggestions. Our organization is based on preliminary findings including, number one, project one hundred thousand, development of a plan to recruit, train and provide financial and educational support through graduation for a hundred thousand American national underrepresented minorities and women over the next decade in exchange for equal time of work

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and service in government labs and for approved employment.

Presently, the emphasis on -- the emphasis is on the gifted and talented in terms of engineering and science, and a Professor Shelad referred to that as bias. We are not against the gifted and talented, but we do feel that in order to get minorities and women in the numbers that are required to come anywhere close to parity, we must look at the average and the normal, also, who have the capability to do science and to do technical careers, but do not have SAT scores of six to eight hundred.

Additionally, from the point of view of America, we need not only PhD's, but we need technicians, we need people who are going to get certificates or who are going to get training in two years and do not even want to be a PhD, but want to have a technical job because that is where career, the career education ladder is and that's where the mainstream is and increasingly the United States is technologically driven, so in terms of mainstream, most people will do better with staying in that career.

Number two, the use of interventions which are tested and proved to be successful and are directed at the specific sex and race, ethnic, special cultural needs. These interventions are the most cost effective means to reconstitute and maintain uniform surveillance personnel for the Department of Defense.

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Number three, give institutional incentive grants based on the recruitment, retension and graduation of underrepresented minorities and women. These grants would follow the national action counsel for minorities in NACME, N-A-C-M-E, model which is a successful -- this would provide for a suggested amount of five thousand dollars to the institution for the first student who is recruited, retained and graduated in SET subject. This would be paid whether or not the student is in the project one hundred thousand. The money would be paid yearly and this program would be evaluated while it's going on.

Number four, give opportunity qualification grants, not loans, to those students who maintain B average or better while studying for a SET career. This money goes directly to the student regardless of whether she or he is in the project one hundred percent or not, and we suggest five thousand dollars a year as the amount. Next item, give one year new career awards to those civilians, in uniform retirees, from the defense department who have the skills and will commit to a career teaching science or math in schools. This recommendation has been publicly supported by Secretary Weinberger and Secretary Bennett of the Department of Education, but there is no funding for retirees.

Next number, it is impossible to overemphasize the importance of retension programs, particularly for women,

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large numbers of whom report harassment as the reason for their withdrawal from careers. For example, the Defense Department Advisory Committee on Women in the Service has reported over blatant sexual harassment in their report recently. Specialization and division of labor are culturally determined. People are identified, prepared and employed based on overt and covert selection criteria. The cultural view that certain work is man's work and certain work is women's work is still prevalent today in America, I am sorry to say.

We are now in this studying phase two and preparing to start the completion phase. The first phase of the study focused on literature searches, data base planning, programming and compilation, identifying and collecting factors which are highly related to the recruitment, selection and performance and retension of minorities and women in SET studies and careers. Two out of two data file searches produced about twenty thousand documents, all of which were tangentially related to these populations and these subjects.

That is an enormous amount of literature which supports the fact that a lot of work has been going on for many years by district groups. It has never been brought together and looked at a whole, and I think that's one of the wonderful things about this Task Force. Our job is to create a data base, which we have done, for the populations that I

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mentioned and from the ninth grade upwards.

Phase two, then, because of this magnitude, addressed the variety of documents and data located through both the computerized literature search, manual search referrals and a fugitive literature search by telephone and letter, the data base currently is comprised of one thousand two hundred thirty-nine documents, and it is anticipated that another one thousand documents will be identified and entered for a total of about twenty-three hundred. Presently there are seven hundred eighty-five empirical studies.

One of our mandates was to see what has been done already in order not to reinvent the wheel. In other words, there are interventions out there which have worked. There are programs which have been successful. If we are talking in terms of doing more interventions, let's find out what's been done, and it's more cost effective if it worked. The data base is multi-disciplinary, had a wide diversely separate population and viewpoints and diverse statistical treatment base. Therefore, it was determined that a quantitative synthesis such as analysis was required in order to more analyze the findings. We are currently doing that analysis of interventions. This analysis is being conducted at NASA Johnson Space Center in Houston.

Phase three will also be computer incentive, and it is possible through the support of NASA. During phase three,

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processes will be developed through the innovative synthesis of our work, and we will be tested on the primary data selected by the Department of Labor, Office of the Inspector General, the Department of Education, such as the class of '87 and high school and beyond and possibly other tapes. We will hold symposiums, three, focusing on the study research questions which are in my written testimony. These will be held at NASA. The literature search has revealed a gap in data on subjects defined by both gender and race, i.e., Black females, American Indians. Half the literature has unspecified minority populations. They say they are minorities and say they are women, but they don't give us the actual numbers of what groups.

So in terms of saying this works with that group, a lot of studies are just really kind of useless. Also we have six hundred and twenty-five dissertations purchased for the support of the Department of Labor, which contain a wealth of related data to these populations. We will be looking at program data from ongoing programs in phase three such as NASA, which has five thousand engineering graduates and about six thousand minorities currently engaged. We will also continue our interview program because it is impossible to predict with certainty the changing demand for success. We are designing programs which can be implemented in a flexible fashion to keep and encourage the retension of those already

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in set careers.

NASA is forming a consortion with colleges which are predominantly minority, and we will support intervention programs there and we will evaluate, and one of the other is lack of evaluation in these programs of an ongoing basis to so the cost effectiveness can be determined. Defense preparedness requires an adequate control of American national stats upon which the DOD can draw its surveillance uniformed personnel. We face critical shortages in the Nineties. One of the things that's ongoing at the present time is the increase in foreign students which others have alluded to. For example, foreign students complete engineering graduate studies with one thousand four hundred and forty-one of three thousand six hundred of '86 PhD's grants in a study by American universities going to foreign students. By comparison, four Native Americans, thirty-eight Hispanics and seventeen Blacks received PhD's in engineering in 1986.

Foreign students earn thirteen thousand four hundred and fifty-one engineering degrees at American universities and Native Americans, Blacks and Hispanics earn five thousand two hundred and thirty-two. Twenty foreign countries graduated more PhD engineers than we did Black students in America in 1986, so we are not doing a great job. We just need to concentrate a little bit on growing our own as well as developing the countries such as Japan.

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In the first year of the completion phase I'm happy to say we will be supported by the National Security Agency in order that we can extend the case data base to below the ninth grade, so we are going now to look at a temporary and secondary education, which we haven't been able to do before. I would like at this time to call for cooperation from federal and state departments and agencies, the private sector foundations and other interested persons to help in the formation of our data base. A great deal of time, money and energy can be conserved if the following three suggestions can be implemented. Direct program managers to send us copies of funded studies on this subject, especially evaluations. Sending us copies of the hearing testimony, including the questions asked so that we can relate these to our knowledge base and perhaps provide some insights to facilitate the exchange of information between these organizations and use that data base by institutionalizing the arrangement in the form of memorandum of understanding or a letter of agreement or some other documentation so that the flow of information does not cease when the person responds either transferred, promoted or retired. Finally, the most cost beneficial first step, to retain those persons who are already engaged in SET studying careers.

Thank you very much for having me here. I will be having further information during the next three years which I

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will be pleased to share with you.

DOCTOR REYNOLDS: Thank you very much. Questions from the Task Force?

MS. BISHOP: You mentioned relationship between progress of women in the area and sexual harassment. Would you elaborate on that a bit?

DOCTOR KAY: One of the things we are looking at is occupational segregation. Why is it that women cluster into certain occupations and then those tend to be -- whether they were low paid before women cluster, they have become low paying when women clustered there, and it's a possible hypothesis which we want to look at, but sexual harassment may be one of the reasons that women cluster in certain occupations where there are other women. Anytime a women today, an engineer or physicist or even a chemist, she is engaging in a nontraditional career. In other words, she is in an environment which was designed basically by white males for white males and is populated by white males, so she is in an unfamiliar environment which may or may not be hostile. The sexual harassment may be one of the ways along the stereotyping that women are not retained. I don't know. I just think it's something that needs to be looked at because it is a possibility.

MS. BISHOP: One other question. When do you anticipate completion of the project?

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DOCTOR KAY: Three years. We are going into the completion phase now. We are getting ready to do interventions and evaluate them, and also, as I say, look at ongoing programs and have symposiums, too.

DOCTOR CLIVE: I ran into a Black female mathematician earlier this year who was a lieutenant in the navy who is quitting because she was assigned to supply officer on a ship where they were using mathematical skills to count the number of doughnuts, I suppose, and other things, and what occurred to me was, well, this is a terrible waste, but then I thought, but isn't this what the armed forces are all about? Don't they just do this routinely, and I'm wondering if you know anything about this, whether or not the armed forces have improved on their ability to take the skills of people and put them where they are supposed to be, because I would think this would have something to do eventually with getting folks from minorities groups and women into the kinds of occupations we are interested in having them, but then having them actually used the way they are supposed to be used?

DOCTOR KAY: That's a good point. You are speaking of underutilization, and this is something that does seem to occur. I don't know statistics on it, but I have anecdotal data that it does occur with women and minorities and they are not utilized, and therefore in companies they are not in the mainstream fast track. You get to be a manager, never mind

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the CEO. Along with this goes the statistics that women and minorities tend to be underemployed and when they lose their jobs, they take longer to be reemployed usually, so I think this is a good point. I don't have anything on it, but I will take it under consideration.

DOCTOR WILLIAMS: Perhaps what would be the final product of this study?

DOCTOR KAY: Tested interventions and evaluations of ongoing programs.

DOCTOR WILLIAMS: In the full as near as possible the full pipeline?

DOCTOR KAY: Yes.

DOCTOR WILLIAMS: But no similarity in terms of employment?

DOCTOR KAY: Yes, what's really needed in order to know what the problem is, frankly ongoing longitudinal evaluation data, and one of the things we will do for our intervention is the ongoing -- we said three years we will be collecting data. We would hope that institutions as we sensitize the institutions by having interventions that work, that they will provide mechanisms to keep this, and one of our men from the army research institute which we were working on that really was an evaluation module. In other words, something that was more or less kind of almost generic for different types of projects which people could use in the absence of any other

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evaluation, more complicated evaluation so that there would be some collection of data and we would have some relationship to each other. That's a hard one to go by, and we hope to raise this question at the symposium where we ask people to give us input on that, because evaluation is desperately needed.

DOCTOR JENKINS: What would you consider an intervention that combined Doctor Tobias' statement that we should confront the illiteracy in math and science and your statement that we should look at the average normal human being for some of the talent in this one hundred thousand plus, and start a program that trains welfare mothers who are adults in math and science and remove the fear and have them teach their youngsters math and science so that they can do better in school. They learn how to be better parents. They also learn a technology that they can utilize in jobs for future employment. I wondered if you would consider such an introduction?

DOCTOR KAY: Yes. That would be marvelous. We would work with whatever institution would be interested, maybe a community college, maybe a high school depending on what levels they were at, but it is true, of course, the more interested the parent is, the more the children -- and there have been programs in some schools, computers at home with children so that the children could teach the parents. There's a wonderful program in San Diego called AVON 8. Gloria Rodriguez does that. She works with infants to three

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years old with child and the mother, and she was the first grade teacher and she said at age five and six it's almost too late, so she started at birth with her mothers, and she asked these mothers how they perceived their role with their children, and all the mothers said, "Mother."

And Ms. Rodriguez said, "You don't consider yourself a teacher?"

And they said, "No, I'm the mother. The teacher is at school," so she realized right there that there was an educational process, and now is under a grant from Carnegie for three years to evaluate her program.

DOCTOR REYNOLDS: Thank you, Doctor Kay, that's very helpful and most interesting and stimulating. We appreciate your being here. I'm going to turn the chair over to my good colleague, Jamie Oaxaca.

MR. OAXACA: Ann has to catch an early plane. I suspect somebody is threatening the budget in California. At this time we switch over into the folks that were not scheduled, but before we start with them let me kind of talk a little bit about the ground rules. It's a three-minute ground rule in order to meet the time constraint finishing at twelve thirty. Before we start with those folks, I would like to ask Mr. Tony Gallegos who is the executive assistant for Pete Domenici, the senator from New Mexico, who has a message for us, and Pete Domenici is a very strong supporter of the Task Force and is a

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very sharp senator with a lot of vision and recognizes that this is, indeed, a national agenda. Welcome, Mr. Gallegos.

MR. GALLEGOS: I'm very happy to be here today to represent Senator Domenici who is back in Washington trying to do his part to making sure that the federal government stays in business over the next few weeks. I think this is of particular interest to those of you here that happen to receive a federal check. On behalf of Senator Domenici, I welcome the Task Force and other guests who are visiting our very beautiful state for the first time. Many friends on the Task Force and in the audience extend their best wishes. As some Task Force members, such as Mr. Herb Fernandez and Mr. Rios, the senator is deeply involved in many issues involving minorities. He has consistently directed specific efforts, legislation and initiatives toward quality of life improvement for women, minorities and the handicapped.

For those of you that are not familiar with some of Senator Domenici's current efforts, I would like to go mention a few of these just for the record. The recent Navajo Economic Summit, Chairman McDonald in his response in school effort, which we hope is the seed of something that will spread nationwide, mainly the eight Northern Indian Pueblos Economic Development Project. Several national projects to address depression, schizophrenia and other mental illnesses, and with New Mexico on the cutting edge of this nation's

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science and technology, I must also mention the Senator's hard work with a variety of minority development programs, and more specifically, his assistance with the funding to those programs.

He's about to introduce a piece of legislation back in Washington that will be directed specifically to what we normally term at-risk youth, and this certainly crosses all of the various interests we are talking about here today.

I will stop at this point in the interest of your valuable time, and also because the Senator's friends such as Mr. John Garcia and Doctor Henry Casso will be testifying before you this afternoon. I'm sure that they will give you a very clear presentation on the status of New Mexico women and minorities. If you haven't visited our state fair yet, I would like to encourage you to see some of New Mexico's culture firsthand, much of which has been contributed by New Mexico's women, minorities and handicapped. I would like to thank you for allowing me to say a few words on behalf of Senator Domenici. I commend you for the fine work that you are doing here today and wish you continued success.

MR. OAXACA: Thank you, Tony. Please give the Senator our best, and tell him we will continue to put the arm on him for help. It's now twelve fifteen, so we have fifteen minutes to ask for people for three minutes apiece which leaves us three minutes for questions for the four people in order to

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finish at twelve thirty, so I would ask Francisco GUEVARA ~~Herrera~~ of the Mexican American Engineering Society to come up and give us three minutes of wisdom, and if you have your testimony, you know, Jamie Carmer from Kirtland Air Force Base has put together that information.

MR. GUEVARA ~~HERRERA~~: Thank you, Mr. Chairman. I am Francisco Herrera. I'm a registered professional engineer in the State of New Mexico, and I'm an employee of the Los Alamos National Laboratory. Also, I happen on to be the newly elected president of the Mexican American Engineering Society. On their behalf, I want to thank each and every one of you Task Force members for taking the time to carry out this important information-gathering mission.

The MAES membership is concerned about and recognizes in accordance the utilization of women, minorities and handicapped in science and technology. I assure you the MAES membership is one hundred percent in favor of remedial action to improve the participation of the above groups at all levels of our nation's technological endeavors. Individual MAES national officers and local MAES chapter officers are ready to volunteer their services to any Task Force or committee concern correcting underutilization of affected classes and federally supported programs.

I wish to enter the following information into the hearing record, and I have provided two copies so that MAES

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may be identified as survival source of expert opinion on the status of minorities in science and technology. Also that MAES may be identified as an organization emerging as a skilled entity in the implementation and evaluation of exemplary programs and long-range planning. The knowledge and dedication of the members of MAES is at your disposal.

I have in my material that I have submitted a thorough description of MAES and its programs. Their outstanding program right now, the one that we have most funding for for NASA for twenty-five thousand dollars is the PACE, which is Promotion and Awareness of Careers in Engineering. That program takes the major effort of our students that we have in the student chapters in six universities throughout the southwest.

In conclusion, before I violate the three-minute rule, let me say that in addition to the PACE program, MAES carries out several activities throughout the year at the local and national level. The eleventh annual MAES international engineering symposium will be held October 14th through 17th at El Paso. The twelfth has been scheduled for 1988 in Los Angeles. The symposiums have proved to be an international experience in academia and the private and federal sectors. These annual meetings bring together from throughout the country, technical paper authors, motivational speakers, science and engineering students from campus and

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exhibitors and recruiters from private industry and the federal programs. MAES has appointed Mr. Oscar Gonzales.

Was that the three-minute sign there? Well, let me just say in conclusion that MAES is an organization that is atuned to the concerns regarding the status of women, minorities and the handicapped and federally assisted technology programs. MAES is in need of and worthy of all the support it can get from the university, industries and the federal sector in order to carry out its goals which are fully in the interest of the future of this country.

MR. OAXACA: Thank you very much. Short question.

MR. REYES: Francisco, you only gave three minutes but I wish you would give me ten minutes. I'm a speaker at the symposium. I would like to have at least five minutes to expound on the good of the Task Force at your symposium in El Paso. We only gave him three. I would like to have five to talk in El Paso.

MR. OAXACA: You are going to be in trouble because I'm the keynote speaker right before you are.

MR. REYES: You will be probably be a little late probably.

MR. OAXACA: Thank you so much. I would now like to ask Mr. Matthew D. Padilla who is the assistant VP for administration and student affairs of the University of New Mexico. Welcome. You have got three minutes.

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MR. PADILLA: It won't take long. I have heard a lot of really good suggestions today, a lot of positive input. However, the bottom line is, especially for minorities, the bottom line is money. UNM has made a commitment to increase minority participation at UNM and hopefully across the entire university system in New Mexico. However, when we go out and talk to minorities that are very definitely college material, the first question they ask is what is it going to cost us? How much and where do I get the money to pay for this? Well, there are some grants. However, they have been cut drastically. Work study monies have been cut drastically. Even loan monies have been cut. Not drastically, but they have been cut.

So I explained to -- I'm sitting there with a prospective student and telling him, "Okay, this is the cost of our university."

We end up adding the twenty-five hundred, three thousand dollar per year lien to that so the student looks at it and says, "Look, in four years or in five years I'm going to owe twelve, fifteen thousand dollars, maybe more than that," and I have to answer, "Yes." Well a lot of these students don't think that's worth it. You are talking to a poor student from Tome, for example. He is ready to come to college, he is enthused, he's very poor and then you are telling him that at the end of four years or five years when

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he graduates he's going to owe fift -n, twenty thousand dollars. To him that's incomprehensible. "I'm already poor. I am going to be poorer when I get out of college," and I think this is a very, very important point.

We need to look at increasing financial aid. I have heard it a lot, you say, "Well, the State of New Mexico should take more of that responsibility." The State of New Mexico can't take more of that responsibility, so basically what I am asking here is that will the federal government go back to the levels that it used to have for financial aid. If we don't do that, we are not going to increase minority participation in any of the areas, and we are not going to -- for sure we are not going to increase it in science and technology, because usually the graduation takes a little longer. Students take a little longer to graduate. You are adding more loan money. They are going to add more money when it's done, and it's not going to be worth it for them and we are having that difficulty right now in our recruitment. They are saying, "Heck, how much? How do I pay for it? You add the loan to that, in five years I'm going to owe too much money. I'm not interested." Thank you very much.

MR. OAXACA: Any questions?

MR. FERNANDEZ: There is planning throughout the state trying to address a question of total financial aid for incoming students. Has the University of New Mexico taken a

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stand as to how to package it and maybe identify more clearly where they need additional funding?

MR. PADILLA: We feel that we need more grant money because the only way that we can convince these students to go into higher ed, to go into engineering, to get any more grant money because they just don't want to owe money at the end. I guess we are working on more presidental scholarships, we are working on institutional monies, yes, but that's not going to cut it. We need more grant money.

MR. OAXACA: Thank you very much, Mr. Padilla. I would now like to ask Ms. Marilyn Morgan, an equal opportunity specialist of EG&G. Then I would like to ask Rosemary Frederickson of EG&G maybe. You only get three minutes, not six minutes.

MS. FREDERICKSON: My name is Rosemary Frederickson. I'm currently a computer scientist at EG&G, Los Alamos, and I would like to tell you a little bit about a program that worked and it didn't cost the government lots of money. I'm also going to -- I'm going to say "we" in my paper because I wrote this with a fellow classmate, and so it's we. We are two middle-aged women who have successfully completed the reentry into the scientific work force as computer scientists. In 1981, we were two homemakers busy with raising a family and doing volunteer work in our community. Through our husband's associations with various universities and their

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encouragement, we were afforded the opportunity all these years for continued intellectual development with university courses. However, when the availability of the women in science, which I will call WIS from now on, reentry program presented itself, both of us reached the realization that our job skills were out of date, and it inspired both of us to apply for the reentry program.

The WIS reentry program was designed for women who had a previous degree in a scientific field, which after several years of neglect might be considered out of date. Also considered for this program were women who had degrees in nonscientific fields, maybe who were suffering math anxiety previously and who were contemplating a career change. The applicants were carefully screened, interviewed and given math placement tests by a committee of WIS members to judge their likelihood to succeed in the program.

It was designed as a two-year program in which each participant took a full load of academic classes at the University of New Mexico, Los Alamos campus, and in addition, each semester from the second semester on would work twenty hours a week in an internship position. These were entry-level technical jobs which had been established in cooperation with the Los Alamos National Laboratory, EG&G and other scientific companies in our community. Once a week the WIS committee gathered all participants to help with professional

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development skills such as interviewing, resume writing and time management. We successfully completed this two-year program, at which time our intern jobs and with the skill and experience gathered in the previous two years we were able to enter the technical scientific work force with no trouble. Each of us was able to find a permanent full-time job. One was a job within a different group in the Los Alamos National Laboratory, and the other was an opening which had become available at EG&G.

The self-confidence gained in the reentry program with the encouragement from other career oriented professional WIS members inspired both of us to continue our education independently and to earn a bachelor of science degree. This degree has enabled us to move into scientific career positions. We feel a program of this nature is important for the educated financially secure homemaker wishing to make a reentry into the work force. Although not in need of a large financial support to get the additional training required, she does need the encouragement and support of professional development and guidance and career placement and the inspiration of successful role models.

MR. OAXACA: Any questions? We have two minutes for questions? Thank you very much. A little bit of housekeeping, we are going to start again promptly at one thirty with the afternoon agenda on those people that are

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going to be testifying before the Task Force, and I would ask the Task Force members to be aware that lunch is going to be in room B. The rest of you folks that are not familiar with the area, there are a lot of coffee shops, et cetera, around in the areas, and so we would hope that we will see you promptly. We will be starting exactly at one thirty. Thank you so much.

MS. FREEMAN: Mr. Chairman, I would like to ask that the members of the social factor subcommittee have lunch together if they would, please.

(THEREUPON, the proceedings were in recess.)

MR. OAXACA: We can quickly review. The scheduled presenters that are going to be testifying are allowed ten minutes. The bell will ring at nine minutes, which gives you one minute to finish up. We have a lot of people testifying, so we will be moving shortly. If there are folks that haven't turned in their material, the lady in the back from Kirtland Air Force Base, Ms. Jamie Cormere, is collecting the testimony, so let me quickly introduce the representative from Congressman Bill Richardson's office, Mr. Gary Townsend, the district director who is going to give us a short welcome and greeting from the Congressman's office.

MR. TOWNSEND: Mr. Chairman, members of the Task Force, Congressman Richardson is very grateful to be asked to appear today. I have a written statement from him that I would like

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to leave for the official record of this Task Force and its hearing. The Congressman can't be with you today. He's in Washington. Congress is in session. As his district director, he asked me to pinch hit for him. I would like to say, and I will be brief, that Mr. Richardson is pleased at the makeup of the Task Force noting that two individuals from his State of New Mexico are on it, Doctor Miguel Rios, Junior, and Mr. Herb Fernandez.

The Congressman serves on four committees in Congress in the House of Representatives, one of which is the education and labor committee has a very great interest in the kind of laws and legislation that have historically had importance to the country's minorities and individuals who have been in a position of not having equal access and better opportunity to education and career advancement, so as a member of Congress who also represents a district, the third district of New Mexico, is unique. It was created by the 1980 census, and spread geographically across the northern part of New Mexico and is both one of the largest in the country, but also is one of the most adverse ethnically of any of the country's congressional districts, being about forty percent, Hispanic surname, forty to twenty percent Native American and remainder Anglo.

Mr. Richardson is a strong advocate for those individuals who for reasons of physical handicap, gender or

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ethnic origin do not receive fair treatment and opportunity for educational and career advancement in America today. His advocacy in this Congress and in the two preceding Congresses of which he has been a member is extensive on issues of health and education and related matters. His advocacy is evident in his committee work, as I previously said, in education and labor, but also on the energy and commerce committee.

For instance, Mr. Richardson recently had a floor colloquy with a Representative Waxman from California, chairman of the health and environment subcommittee of energy in Congress. Mr. Richardson, reflecting the makeup of his constituents in his concern for individuals who have a need for opportunity in America, made an exchange with the chairman of the subcommittee for the official record for the congressional record. His intent was to ensure that minorities who are disproportionately affected by the AIDS virus would be adequately represented on the recently formed National Commission on Acquired Immune Deficiency Syndrome.

Similarly, Mr. Richardson has established a Task Force of experts in the education field to improve minority participation in the teaching profession. Mr. Richardson is a strong believer in the education of young people. He serves on the elementary subcommittee of this education and labor committee, is a point at which the kind of barriers to access need to be broken down. As a member of the education and

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labor committee, he has commissioned a Task Force to prepare, advise and draft legislation which will directly increase the numbers of minorities entering the teaching field.

One intended outcome of this commission and Task Force would be diminishment of significant dropout rates by minorities in this country. Mr. Richardson, likewise, as an original co-sponsor of the Civil Rights Restoration Act of 1987, HR 1214, which should have passed the hundredth Congress and be signed by the president, would restore civil rights protection against discrimination based on sex, race, disability and age, which a 1984 Supreme Court ruling, Grove City v Bell has profoundly weakened. For your information, this legislation is pending house committee action, and a senate companion bill was introduced this past February by Senator Edward Kennedy, Democrat of Massachusets, has been reported from the committee and is now to the senate calendar pending floor action, so Mr. Richardson is an active legislator.

He is on the committees of importance to groups like yours, and he believes that actions such as the ones I have mentioned, ones that I see on your list of presenters you are thoroughly looking into. That these kind of activities go far towards breaking down stereotypical images of handicapped individuals, minorities and women. These actions can go far to establish new feelings of confidence, capability and given

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time, will improve productivity as such individuals participate in the work force in increasing numbers and with increasing skill.

The Congressman asked me in closing to make note that he is very pleased to acknowledge affirmative action by an organization here in New Mexico concerning efforts to create a less restrictive and less segregated work environment such as your Task Force is commissioned to look into and report on to the Congress and the president. There is an organization called DRESCO, Incorporated, with programs in Dona Ana, Sierra and Socorro Counties of New Mexico. That has established a notable record in the area of community integration. DRESCO's notable record in placing developmentally disabled individuals in the work force has come to Mr. Richardson's attention, and he is very pleased to commend them and other such organizations that are similarly active in community integration for their efforts to foster work environments free from architectural barriers and where handicapped individuals, therefore, can be productive in jobs without undue supervision that would create a loss of self-confidence.

In summary, Mr. Richardson thanks you for this opportunity to provide his viewpoint. He is very supportive of the goals of your Task Force. He is very pleased that you intend he understands to present interim reports to the

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Congress. He looks forward to close communication through your executive director, through your Task Force members or otherwise, and wants to be very much aware of your progress, your aims and your hoped-for accomplishments. Thank you very much.

MR. OAXACA: We thank you, and in advance we thank the Congressman because we are going to be asking for his support as we go through this very critical agenda which, in our mind, is just confirming what we all suspected, that in the year 2000 we will have had to have had the problem solved or we are in serious trouble, because that's going to be the pool from which we draw to be able to handle the needs of people in the science and technology field.

MR. TOWNSEND: Thank you very much, and I will convey to the Congressman, and he will anticipate and look forward to such communication. May I provide the statement to your clerk for the record?

MR. OAXACA: Absolutely. Sue will take it. If there's any questions for the director, does anybody have any questions for the director? Thank you so much.

MR. TOWNSEND: Thank you again, Mr. Chairman.

MR. OAXACA: Sue has one housekeeping announcement.

MS. KEMNITZER: Jamie Carmer has graciously offered to give people rides to the airport at four forty-five. Doctor Brasel is her first customer. If two other people need to go

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to the airport immediately after the hearing, please check with her. She is standing in the back in the gray suit. Thank you.

DOCTOR DANEK: Could we have one earlier shuttle? Could we have one at four?

MS. KEMNITZER: We will make arrangements for you one way or another.

MR. OAXACA: I might point out at this time that the folks from Kirtland have been more than gracious in providing all these different services to bring the folks in and out that are so key to this particular session. I would like to ask Mr. Jerry Watkins, the superintendent of the New Mexico School for the Visually Handicapped to please come up and testify. Welcome to the afternoon session.

MR. WATKINS: Thank you very much, Mr. Chairman. By now I'm sure the members of the committee more than amply feel welcomed and acknowledged and applauded, but, Mr. Chairman, being from the southern part of New Mexico I must add my greetings to you and welcome in a sense of appreciation for the agenda here today and the opportunity to participate in it. Mr. Chairman, by the way, in the event you have forgotten your early roots, Alamogordo, New Mexico is just up from El Paso there.

MR. OAXACA: We always used to eat at the Rocket Motel for breakfast.

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MR. WATKINS: Thank you for remembering, Mr. Chairman. Again, we do thank you for the opportunity to comment about the needs and aspirations of our respective special interest areas, and I certainly have one. I am here today as superintendent of the New Mexico School for the Visually Handicapped, and please forgive me when I say an institution that is generally considered to be one of the more progressive and effective programs for the schoolaged blind in our country. We hope that reputation is deserved. We strive to be deserving of it. We believe that we are committed to the notion of building on that reputation, whatever justification it may be.

Mr. Chairman and members of the Task Force, I have prepared a formal paper for you, and I have extended that to the Kirtland representative, a very charming woman, the role of residential schools in preparing blind children for their life's work. I hope that you find the paper to be sufficiently done. I enjoyed preparing it for you. My comments today will be somewhat peripheral to the paper itself. Also, Mr. Chairman, the first copy of our 1987 year book will be extended to one end of the table or the other, and I hope that it will give you a glimpse of an exceptional group of young people and hopefully an exceptional program as you take a quick look at that.

Mr. Chairman, the paper I have developed describes

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just how residential schools in today's climate and spirit of integration and mainstreaming can, indeed, continue to play a viable role in the overall scheme of things in terms of provision of services to the low incidence population called blind or visually impaired. I have attempted to describe the successful adjustments that some progressive schools have made during the past decade in an attempt to become effective resource centers for local school districts, for the state department of education, for teacher training institutions, for teachers in public school places, for parents of visually impaired students wherever they may live, and for other agencies who in a peripheral fashion serve the needs of handicapped children, and of course, most of all, an appropriate resource center and access for the children themselves in terms of the instructional resource center, again, without regard to wherever they may choose to go to school.

Mr. Chairman, members of the Task Force, we are committed to the notion of having kids come first. That sounds a little trite. It rolls off the tongue too easily at times, but we believe that absolutely essential with the changing mode of society and with the changing value systems of our society so far as institutions are concerned, to set aside the more traditional territorial anxieties and turf conflicts that we have experienced in the past decade, and

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forward building -- honestly building advocacy and support partnerships with local school districts, with state departments of education, and in locating and acquiring appropriate materials and in-service training and resource opportunities in a timely fashion.

We believe, Mr. Chairman, that that reputation I made reference, to a very large degree is because of some significant success that we have had in that arena, and Mr. Chairman, in a state like New Mexico, one of varied rural characteristics it does, indeed, pose upon local school districts a real challenge to provide for the low incidence population a mainstream or a community based educational opportunity. So for those students in New Mexico who find for some period of time a residential placement necessary, we desire to provide the most quality and comprehensive program that's available.

We are committed to the ultimate goal, members of the Task Force, of guiding all visually-impaired blind students forward the goal of appropriate and successful employment opportunities along with the opportunity for a full social citizenship integration into society. We take those words not lightly. They are the guiding theme for our entire program implementation.

Mr. Chairman and members of the Task Force, you are very fortunate indeed today to have as the next speaker a

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visually-impaired individual who has broken through many of the restrictions of employment by virtue of technology that is currently available to our citizens, and with the advent of this technology, I believe that there's a whole smorgasboard of adaptive strategies that virtually should remove the impairment barriers for blind and visually-impaired persons that had previously been in place. With the capability we now have for converting printed materials into synthetic speech and into braille and other tactile formats, we believe that job opportunities should be opening up in all arenas for visually-impaired persons.

The bottom line, members of the Task Force, is simply that we would urge you to understand that the legitimate barriers for employment for blind persons no longer are valid, and that to a large degree with very modest adaptations and accommodations jobs throughout the spectrum of the workplace really should be accessible to visually-impaired and blind persons without resorting to that on -- and without resorting to that same kind of generalization that we have shrunk away from. We believe that most often handicapped persons are motivated to such an extent they are more than -- they more than compensate in terms of dedication, energy, commitment, pride for whatever minor accommodations might be required because of a certain disability.

Mr. Chairman, my paper will demonstrate that

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residential schools throughout the country today who are willing to be innovative and progressive, flexible, are kid-oriented, can continue to play successful and important roles in the continuum of services that are available. In addition to the paper, Mr. Chairman, I have called your attention to our year book, which, once again, we believe provides a quick glimpse at a very exceptional, unusual and impressive program, and we are pleased to extend that to you. Mr. Chairman, I believe that I stayed within my time. I would more than welcome questions from the Task Force.

MR. OAXACA: Questions, please?

DOCTOR CLIVE: Mr. Watkins, what science courses are offered at your school? What math courses are offered, and in particular regard to the science courses, what kinds of equipment is available to the students that is particularly adapted to people who are visually impaired?

MR. WATKINS: Thank you, Mr. Chairman, thank you Task Force members. Forgive me, I missed your name. We do have at the school -- I'm going to answer your question in two parts. We have general science and biology currently offered at our school. We have some thirty students who are at grades nine through twelve. Of the thirty students, sixteen of them are mainstreamed into the local public school for the advanced science classes, including chemistry and including physics and some of the other courses.

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As far as math is concerned, we stop at the algebra-one level, and again for our brighter, more impressive students we mainstream into the local school district. We do have a full-time person in technology working with the Kerso Reading Machine, visual text, with the various closed circuit television modems and with the Verse-a-Braille. The students themselves take the Verse-a-Braille to the classes in the public schools sector, and we have two full-time aides who are accessible to the public school teachers to convert testing materials into either the recorded format or into the Braille format.

DOCTOR DANEK: I was simply going to ask you, for the record, if you would, if you could recommend something to us that would be the one item that you would say that we ought to stress in our deliberations about the visually handicapped students? What would that one thing be in terms of policy?

MR. WATKINS: I appreciate the question, and without reservation could simply ask that the Task Force, along with all other citizens, take a giant step backward and look once again at the hurdles that the inappropriate restrictions that have been placed in the employment of handicapped individuals, and to accept the notion that there are, indeed, with modest adaptions today an opportunity to employ handicapped persons.

DOCTOR SCADDEN: I would like to ask Mr. Watkins, when you talk in terms of employment opportunities, and I one

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hundred percent agree with you, especially with the possibility of using computers and other technology, what are you doing or what are you able to provide the mainstream schools as a resource within the State of New Mexico to assist them in showing, in this case, blind or other disabled kids the role models? You indicated the next speaker is one himself, but are these resources that are currently being used within the schools in New Mexico?

MR. WATKINS: I hope so and I believe so. We currently have twelve members of our own faculty and staff who are visually impaired, blind persons. Oftentimes, of course, serving an excellent role model in the sense of doing rather than telling, but aside from that, our board of regents has given us a top priority. The acquisition and appropriation of materials to the more than four hundred visually impaired students in the State of New Mexico who do attend public schools or other institutions within the state. It's in that arena that we really -- would really feel that we have made some major inroads in making mainstreaming possible, in making shorter-term placement, residential placement also viable.

It is at our insistence, it is at our recommendation many times that our students who are more academic and more able students are mainstreamed back into the local school district, and here, once again, I make reference to the turf and territorial issues that have seem to be such

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an impediment to the mainstreaming process. Nothing gives us more pride and satisfaction than for one of our students to be able to stay at home with the family and with the support that we are able to give them through materials, in-service consultation from a variety of sources make that a joint partnership and a successful experience. We believe that the mainstreaming of our own students into the local school district is an excellent transition into the community based educational opportunity.

MR. OAXACA: Could we ask you, could we prevail upon you to maybe give some thought to giving the Task Force information that relates to the following: What is it that our report should recommend in the way of capital investments for that unique technology that's going to facilitate and encourage the visually handicapped to starting, I would imagine, from day one through those capital investments that have to be made at the university and at the graduate level, so that nowhere along the line can the system use as an excuse the fact that, by golly, we would love to do it, and because if you are going to put reality to getting the PhD candidates that are visually impaired, we shouldn't put a temporary and probably not valid obstacles for the progression of the ladder in the educational area of these very bright folks.

MR. WATKINS: Mr. Chairman, members of the Task Force, you will be pleased to learn that our board of regents has

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over the period of the past five years placed a thirty-thousand-dollar Kerso reading machine in the state library and the University of New Mexico Library and in the New Mexico State University Library. It's a commitment that we take very seriously providing at least that access to technology for higher education of students. Bill Davis, who is our coordinator of media at the school, is a nationally known figure and I will ask him to assist me in giving a very appropriate response to the Chairman's request, and being one who serves on the board of the American Printing House for the Blind and on the American Foundation -- as a consultant, the American Foundation for the Blind, I believe that Bill Davis and I will be able to respond adequately to your request.

MR. OAXACA: Thank you so much for your testimony.

MS. BISHOP: May I add another to that? I'm looking at employment again, and if you are trying to get the visually impaired acclimated into the employment world, again, what types of equipment in terms of capital costs would an employer have to put out in order to make a person with that handicap feel a part of the employment world?

MR. WATKINS: I believe that there is a panorama of technology that would respond to the question. Again, it would have to come back to the specific employment condition. For example, there are modifications, adaptations made to PBX switchboards now that make that job available to a totally

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blind individual. The Versa-Braille and the -- of course, the Kerso Reading Machine that I made reference to, some thirty thousand dollars, and obviously although the army did buy one for Ted Barber, your next speaker, that's not a realistic acquisition for most small businesses. There are, however, closed circuit television for low vision persons that are available for the two or three -- at the two- or three-thousand-dollar range, and then the Versa-Braille is available to convert print into Braille format. That's available for six- to eight-thousand-dollar range, but most often blind individuals who become professionally trained are willing to invest in such equipment themselves, so oftentimes it's not a request made of the employer other than that perhaps some accommodations for a transition period of training or that sort of thing.

MR. OAXACA: Thank you very much. I would like to ask Mr. Ted Barber, a physicist at the Atmospheric Physics Branch of the US Army Atmospheric Science, White Sands Missile Range.

MR. BARBER: Thank you, Mr. Chairman, and committee for allowing me to give you a little insight into probably the other side of the picture from what Jerry Watkins was just telling you. Something in my case, it's not necessarily the obvious, that I had a small problem when I was sixteen and became legally blind, and with this condition I went through college and got employment down here at White Sands Missile

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Range as a physicist, and have experienced many of these things. I gave a write-up to Mary Orlando, I think her name is, if any of you wish to read it over. I will touch on some of these points a little more.

One thing I will say is that the public schools could help many of these problems with minorities, particularly, or handicapped, or in many cases women become much more comfortable with science is to start, say, like in the sixth grade and don't have a teacher simply get up and talk to the students for like fifty minutes and then suddenly say, "Well, students read your book." In a sense, change their direction slightly where they talk for just a few minutes and then have the students break up into small groups and do things so they have hands-on experience at things that were sufficiently simple for their particular range of schooling.

I mean, obviously in the sixth grade you wouldn't want to expect them to work with transistors, but such things as I see could be easily developed, and I think it would make all three of these categories of people much more comfortable with science and the same thing. You could do this as you came on through high school and, you know, particularly in college, a point that I and another man here was just discussing just before the lunch break ceased was the fact that in many colleges I hated to comment, but this is true of,

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I think, all colleges, their instructors are not really instructors. They have had no professional teaching training, and quite often are the problem like, say, a visually-impaired person might have is you get a person that is an extremely poor instructor. He might know his material very well, but he doesn't have the ability to adapt in any way to make it a little more understandable to, you know, someone out of the mainstream of the student population.

Another thing that -- and this is in an area where I have had some on-the-job experience is like many people this morning have commented it would certainly help, particularly in -- well, I guess all three categories, if possibly a little more of this federal grant money was opened up to assist, particularly -- well, obviously the poorer students, assist him through college. One thing I have seen, though, working down here at White Sands is a program that many students should be advised of, and this helps the student vastly in science and technology, is what they call a co-op program.

White Sands -- I shouldn't say "we." I mean I work down there, but White Sands hires quite a few of these students half time in this co-op program, and it gives them on-the-job training in the particular field of their interest, and as well as basically it's set up such that they can earn enough money to manage to exist through school, and so that I think down there -- well, like the main place we get most of

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our co-ops from is New Mexico State University. I think they normally require that a student have pretty well finished the first two years of college, then go into the co-op program, and it's odd. People have commented to me down there sometimes they even have a difficulty in finding students that are interested in these co-op positions. And like I say, because quite often these co-ops actually work with us on particular scientific projects, and we don't just turn them into what some people call gofers. I mean, they learn a job at all different levels. I mean, the simple things and the complicated things, too.

Another area that I think might help many of these disadvantaged students where they have not gotten much of a enthusiasm from their parents is this thing of having someone could set up a particular group of role models, people from their particular environment like if you are talking of, say, women or handicapped or minorities or whatever, they could talk to a school group that had some -- well, obviously presently all school groups have girls in it, explain to them the advantages of going into science, because I think many cases they don't understand many of these things, and to hear it firsthand from someone like that is handing an enormous advantage.

I'm a member of a national organization that believes thoroughly in this. It's called the Foundation for

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the Science in the Handicapped. We, as handicapped scientists, work with handicapped students in this manner coming through high school and college. Another area that I think would assist in these -- with these three categories of people -- now this would be particularly true in the federal government -- if they could set up some sort of a training program to take, say, the middle-level managers and almost require them to take some of these short one-week or two-week classes on certain aspects of the benefits of hiring this type of person into the work force.

A retired lab director down at our place was discussing this the other day, and his comment, I think it's true, is that too often a manager now wants to make himself look good, so what does he do? If he has an opening, he tries to hire the most top-notch person in the whole nation into this opening, and it doesn't give young people or people that are disadvantaged at all an opportunity to get into the area, and he says, "Well, okay, this makes him look good." Well, the point of it is if -- I think he understood sometimes it would also make him look good if he hired, say, a handicapped person into a particular position or a woman or something like that so that the workplace was truly a cross section of society, not -- well, like in our lab down there. I don't know. I hate to say it. I think we are about probably like ninety percent white men and that's, you know, almost no lady

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scientists.

And one other area that some of you being administrators could probably appreciate, the same man gave us a comment that in about 1980 the Secretary of Defense sent a DF down through channels saying that here they suggest that each particular work area in the federal government be so many percent of women and so many percent handicapped and so many percent minorities, but the shame there is since then nothing has came down through channels since then, and he said that something like that, particularly in federally funded organizations or military groups would help enormously because it gives the manager a clear-cut goal to say, okay, this is what I need to shoot for and it obviously will help, you know, the disadvantaged, the handicapped, the women, if they at least are considered for a particular opening.

Too often -- I hate to say it -- I don't think they are even really seriously considered, but at one area we have seen down there that drops back to my first comment is quite often a position will open, say, for instance like a meteorologist. We had one extremely good lady meteorologist down there for years. She finally retired and they have attempted to find one to fill that position that is a lady, also, and they have not been able to find anyone in that category that was a woman. Thank you.

MR. OAXACA: Thank you so much. Any questions, please?

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Thank you so much for your testimony. We would like to welcome Doctor Richard Griego, the chair and presidental professor of mathematics of the University of New Mexico. Doctor Griego?

DOCTOR GRIEGO: Mr. Chairman, members of the Task Force, colleagues, ladies and gentlemen, I'm very pleased and honored to have this opportunity to present some views on the problems dealing with access to science and technology on the part of minority groups. I come to you today as a person who has directed a number of science, education and science supported programs, many of them directed at increasing the participation of minority groups in mathematics, science and engineering. As such, I would like to give you a view from the trenches wherein one works on a day-to-day basis on the problems of concern. I would like to present some observations on how some of the programs in which I have been involved with have worked.

First, one must understand some of the demographics of New Mexico because our situation is somewhat different from other contexts in the nation, and our efforts are correspondingly adapted to this region. It's important to recognize that so-called minority groups, and that usually refers to American Indians, Blacks and Hispanics, minority groups comprise a majority of the population in the schools, and also it's important to recognize that these groups usually

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lag behind an important socioeconomic demonstrator such as family income and family educational level.

As a consequence of these demographic facts is that -- or as a consequence of these demographic facts we have often approached the problems of minority groups in the public schools in terms of improving the overall educational system. A rationale for this being that since a majority of the students in the school are our target population, and improvement in the schools in general cannot but help our kids, too, thus, we have given a lot of emphasis on teacher enhancement and training. Of course, we try to take teachers that come from areas where there is substantial representation of minority group students, but in this state, that's a large percentage of the teacher population. The multiplier effect is essential when one addresses the support of teachers. One teacher who is enriched and enhanced by means of a training program will be able to turn around and having positive effect on scores of students.

Another rule of thumb that we use is that social class standing is more important in the state in presenting barriers to educational advancement than mere ethnicity. As a result, we will give preference or participation in one of our programs to a nine-year-old student from a poor family over an Hispanic student from an upper middle-class family or background. This tends to give our programs more of a mix,

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and that, I think, has its advantages. For example, minority students participating in target programs will be less likely to feel labeled as inferior or disadvantaged.

Now, we have directed programs at both the college and precollege levels. Let me address some of the programs at the college level first. A favorite model for aiding minority students has been through programs whereby a minority student is supported as an assistant on a research project directed by a faculty member who serves as a mentor for the student. The student receives a salary and the faculty member receives equipment and supplies and sometimes salary compensation. These projects are very valuable to the individual students, and I have seen cases where such an experience has been decisive in determining whether that certain students have gone onto research careers in the sciences or mathematics.

It has to be recognized, however, that this is a somewhat expensive model, and such programs affect relatively few students, and often these are students who have been self-selected, to some extent, that is such students are often likely to succeed in their studies on their own, and the experiences in the research projects are often not decisive and their academics are viable. A useful model being fronted by the National Science Foundation now makes funds available to existing research projects that will agree to add on minority students as assistants. A rather novel program that

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we once directed provided funds to industrial firms who agreed to accept, train and supervise minority university students as industrial interns. This program also was very valuable and the firms quite often would contribute their own funds to match those of our program.

Now, those models, as I was saying, affect relatively few students. A model that affects larger numbers of students is one in which students are able by means of intensive tutoring combined with counseling and other kinds of academic support. A very successful program in this regard is a professional development program at the University of California, Berkeley. This program endeavored to replicate some of the social and academic support networks that Asian American students had been observed to organize on their own and to utilize the good effect. Maybe during a question and answer I could talk a little bit more about this.

Thus ents in the PDP, the Professional Development Program, are put into situations with fellow students. They share information about classes and professors, they are provided with academic and career counseling in other forms of support. We are now investigating means for establishing such a program at the University of New Mexico. I would like this program because one gets in the trenches, as I say, with the students and helps them survive on a day-to-day basis, and he has the

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potential of dealing with larger amounts of students that are not at the end of the pipeline.

At the precollege level, as I said, our emphasis is on teacher enhancement and preparation. The best programs offer some of our workshops followed by academic year follow-up and support. We have had a major effect in that between teachers and the new technology of microcomputer based instruction. I'm glad to see that the National Science Foundation is once again giving major support for such teacher oriented programs. There's much we can do for supporting our public school teachers and the dynamic interchange in cooperation between the universities and public schools which ultimately benefits the students in which we are interested. Furthermore, such teacher support programs lend themselves to evaluation so that one can assess the impact they have in the classroom. We need to do much more in this state in regard to teacher preparation and enhancement.

Other programs at the precollege level that we have such as intervention programs that work directly with students are often harder to assess in terms of their immediate impact in that they have much longer range effects. They are valuable programs, nonetheless. Let me talk about a couple. A very successful program that we have administered is a Saturday Science Academy with elementary school youngsters attending science classes on Saturday instead of staying home

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and watching television. Our Saturday Science Academy has proved to be immensely popular with both parents and students. The program interests youngsters in science and technology at an early age. Many studies have shown that we lose the interest of many students in science and mathematics during the middle school years, and the Saturday Science Academy tries to interest students before they get turned off.

An intervention program that was immensely successful was the high school science fair team, science fair team that we organized some years ago. This team put together some students who have distinguished themselves in other school activities, but who have never entered a science fair. The peer group support and friendly competition among the students proved to be a combination that led the team of twelve students to garner more than one hundred prizes and awards including four year's scholarship to schools such as MIT and Stanford. Two team members, both young women by the way, went on to compete in the International Science Fair. This was a very successful program that should be repeated in some manner, especially since New Mexico is a state in which there is a lot of science fair activity.

Other programs have proven successful such as summer workshops and science for high school opportunities, but there is no comprehensive planning for funding the kinds of programs described here, the precollege level. I would

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hope that a science museum could be established that could have such teacher support and student intervention programs as part of its educational mission. There's an effort underway right now to establish such a museum, and I think it should be supported by all those who are interested in the future of science and technology in our state.

Thank you very much for the opportunity to address the Task Force today.

MR. OAXACA: Thank you, Doctor. We will now entertain questions.

MR. THOMAS: Doctor, among the two programs, the mentor program and the summer workshop program, what is the mix among the females, Hispanics and Blacks? Do you have that data?

DOCTOR GRIEGO: Which program?

MR. THOMAS: The summer workshop program and the mentor program that you mentioned.

DOCTOR GRIEGO: The mentor program at the University of New Mexico?

MR. THOMAS: Yes.

DOCTOR GRIEGO: Those programs at the university level were for minority students mainly, I would say probably ninety percent minority students.

MR. THOMAS: That's female or Hispanic?

DOCTOR GRIEGO: Well, it's roughly -- I would say most of our programs are roughly half and half, female and male. They

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tend to be a little more female, more representation in female. That goes for all the way through the Saturday Science Academy. In terms of minority representation, I would think that, well, the majority of students in the minority groups, the majority of the students are Hispanic. We make special efforts to try to get American Indians involved, and I would say probably about ten percent, fifteen percent of the students are Black. You have to recognize that in this state Blacks form a very small percentage of the population, maybe three percent. You hear different numbers, but it's small, but we are very aware of balances of that sort, and we try to, like I say, keep a mix. I think it's good for the students.

MR. FERNANDEZ: Mr. Griego, one of the concerns that I have often heard expressed by professors, particularly in the area of mathematics in higher education, university college settings is that when young students come out of high school, the way that the curriculum guide is set, that often school boards vote on, is not the hierarchy, is not in a manner that it prepares them to succeed in the higher education mathematics. Have you or the University of New Mexico worked with the local school systems in setting a curriculum, whether it's algebra-one and geometry and then algebra-two, the way these are set, or are you totally independent from the school systems and the high schools?

DOCTOR GRIEGO: Well, the university sets commission

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standards. I think that has a direct effect on the nature of the curriculum, but it's not -- basically I think two years of mathematics in high school is plenty to get you into the university. There are many problems with the curriculum in high school, and right now there is a national movement to make adjustments in the curriculum. For example, plane geometry, as it's been taught historically, is proving to be fairly ineffective. The idea of one way put it that we should put Euclid to rest after two thousand years, but the idea being that the axiomatic approach in trying to prove theories in high school has proved ineffective, and it would be more effective to try to present geometry in a more intuitive, pictorial sort of way, graphical way, and to integrate it more with algebra, and so there are moves to even get rid of the plain geometry classes. We haven't done anything of that sort.

In New Mexico we have a fairly traditional mathematics curriculum in the high schools. Our main problem is that at the university levels we have increasing numbers of students who are unprepared and our remedial mathematics efforts have shot up dramatically in the last ten years, fifteen years, but we are aware of these problems and, you know, we are trying to work with the public schools on it, but it's a big problem and our kids just don't take enough mathematics and sometimes the mathematics isn't that hot.

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MR. FERNANDEZ: A follow-up on that question, you have been involved at all levels trying to find new ways of how to improve the teaching of mathematics, both at the universities and secondary schools, but if you had unlimited resources, which you won't get, and you had to complete free hand at the university working with the secondary schools, what are some of the things that maybe we ought to cite for our objectives?

DOCTOR GRIEGO: I would have Carl Sagan teaching calculus. With all the technology that one can bring together, you know, and make -- in fact, there is a program that has been put together by Cal Tech called analytical universe where they use some very high-level computer graphics. James Blinn, you know, from Jet Propulsion Laboratory did outstanding work in computer graphics, worked with a group of people in Cal Tech to really make it a real pizzazz science program. In fact, they do calculus, some things of that nature, but I don't look at any quick technological fixes, you know. I think it's just one of the important things, like I said, is really if I were to leave one message with you today, I think it would be support the teachers. Do everything they can to train the teachers well, support them, pay them well and keep them current and active in the life, by means of summer workshops, follow-up academic programs, and really keep in touch with the flow of the educational experience in the public schools and then make

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adjustments at the universities as we need to do, and now again my department, for example, it's the department of mathematics, and we are rewarded for doing research. It's difficult sometimes, and I have come on an exceptional case of a research mathemetician who is interested in these things, but the rewards aren't there financially and other things, and so sometimes the incentives aren't there for a lot of the mathematicians to get involved in this, but I would hope that the universities could take in the equations that they use to evaluate people, that they could give more emphasis or more rewards to those professors who do endeavor to interface with the public schools and teachers.

DOCTOR RIOS: Mr. Griego, my question is along the lines of your primary recommendation. With respect to the precollege teacher enhancement program, were those teachers primarily from the nonscience or were they primarily math and science teachers? Was there a math science factor? Was there a PC factor, computer factor as there historically has been to some extent with respect to math and science, and you said the results could be monitored. Have you monitored such results and what were they?

DOCTOR GRIEGO: I think teachers are starting to get used to computers, but at one point they were freaked out by them, and we did a lot to allay fears of, you know, the machine wouldn't bite you and they wouldn't break them so easily, but

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the jury is still out, I think, on the effectiveness of the computer as a teaching tool. Not as an instrument to program and to work, you know, in and of itself, but as a delivery system I think there's a lot of work that still needs to be done. I think there's a lot of potential, but still hasn't been realized. So in our programs, we take a lot of computer introduction to teachers, but we also work in elementary school teachers, and I think there's a need.

Let me say something about structure the way things are set up in the elementary schools. I think there's a need for math and science specialists, departmental evasion at the elementary schools because an elementary schoolteacher teaches everything, and I think there is a need for, you know, specialization, you know, certain teachers who specialize in science and mathematics, and we endeavor some of our summer workshops to deal with that problem.

MR. OAXACA: Thank you much. We are going to speed up a bit. We have two more questions, Doctor Clutter first, and make them short, if you may.

DOCTOR CLUTTER: Did I hear you correctly to say that you tend to have more girls in all of your programs?

DOCTOR GRIEGO: Yes.

DOCTOR CLUTTER: I find that an extraordinary statistic, because I think that in places like some of the other Saturday academies, for example, they say that they have an extreme

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difficulty in attracting girls.

DOCTOR GRIEGO: We haven't had that.

DOCTOR CLUTTER: Maybe you have some secret that you should teach all of us.

DOCTOR GRIEGO: I don't know. You know, kind of a consciousness and purposeful selection, now. We will just make sure that that happens in the Saturday science.

DOCTOR CLUTTER: Is it a cultural thing, do you think?

DOCTOR GRIEGO: I don't know. The kids are just interested. The young women, the young ladies are as interested in those things as anybody. It's worked out real well.

MS. WINKLER: Real quick, is there a requirement for all undergraduates at the university to take a mathematics course aside from in your remedial requirements, and if so, or even if not, how do you choose who teaches that first course at the university level in the department? Is it graduate students or is it tempered to faculty or how does that work?

DOCTOR GRIEGO: There's a plague of society going on. Everybody seems to think to be smart you have to know mathematics. I don't believe that. I don't think we should make mathematics required for everybody. I don't think fine arts have to take mathematics, but everybody else has to take two math courses, and you know, there's a lot of problems. Let me tell you what goes on. We are a filter for

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professional schools, and the idea is that you want to be an MD or dentist or lawyer, if you are smart enough to get through two or three classes in calculus, somehow the association thinks you are smart enough to be a lawyer or whatever.

So we have the honor or task of filtering out for all these professional schools. So we have students in our classes that don't give a damn about mathematics. They are just there because they want to go to medical school or law school, and I don't really think it is the wisest social policy, and unfortunately, you know, we teach in our department forty-five-thousand student credit hours per year. We are the largest department on campus, and we hire slews of part-time instructors, and I make jokes that we get them out of Yale Park, which is right by the university, but we have gotten a lot of very good instructors who work in businesses, you know, industries around here and people from Sandia, and unfortunately, we depend a lot on them and on teaching assistants to teach the introductory courses. I think it's a tragedy, and I don't think we should be doing that, and if you will give us a big boost in our budget, we won't do that.

MR. OAXACA: On that note, thank you very much for your testimony. Let me ask Doctor John Foley, assistant director of human resources of Los Alamos National Laboratory, welcome to the afternoon session.

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DOCTOR FOLEY: With reference to that previous speaker, I have always been a little bit fond of the derelict. I hope he stays around a whole while longer. Don't be deceived by that beautiful blue sky out there. It's filled with microscopic yellow things that can dry your sinuses up. My name is John Foley. I hold the position of assistant director at the Los Alamos National Laboratory. My area responsibility is human resources.

My credentials and background are a bit unorthodox for this position. I hold a BS degree in physics from New Mexico State University and a PhD in nuclear engineering from the University of Arizona. I have been a researcher in international control of nuclear materials and reactor safety for most of my eighteen years at Los Alamos. I may be one of those hard-core scientists that Professor Tobias talked about earlier this morning. I have served for one year as a US representative to the International Atomic Energy Agency.

Frequently I'm asked, why did you give up good science to go into human resources of all things. You are the ones that ask me that kind of question. My answer is, I have gone into human resources precisely because I'm interested in good science. I'm interested in what makes for good science, both at the individual scientist level and at the organizational level. There is a lot more in common between good science and human resources than most people first

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realize. For example, a concept common to both is diversity. At the individual scientist level good science occurs when problems are tackled through a diversity of ideas, approaches and techniques. At the organizational level, good science occurs when complex problems are attacked by a diversity in the work force, by a diversity in education, in backgrounds and in cultures.

Diversity is a basis for good science. It's also a basis for affirmative action. At Los Alamos our business is national security. Our tools are good science and engineering. We are a big institution with nearly seventy-five hundred full-time employees. We have a huge presence here in northeastern New Mexico. Our technical staff consists of over three thousand scientists and engineers, and over twenty-five hundred technicians. Half of our scientists and engineers, about sixteen hundred, hold PhD degrees. We are a world-class scientific laboratory.

To stay world class we need to seek out and develop the best scientific minds in this country. We have developed many special student employment programs to do just this, and it is through these programs that we are attracting and developing increasing numbers of women and minorities. We have developed these programs because we are interested in good science. These programs are not social programs. They are programs to establish diversity in our work force. We

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have developed about a dozen special programs that target students who are already interested in science and technology. We have also -- we also have about a half a dozen programs that target high school students and teachers in northern New Mexico to encourage careers in science.

As an example of a program that targets students that are already interested in science I will focus on our graduate research assistant program, which is primarily a summer program. The graduate research assistant program is for students who are working toward MS or PhD degrees in science and engineering. Students work on real science and engineering projects. These are not make work projects. The students contribute to the output of our laboratory. These students are recruited throughout the nation. Many return a second and third summer. We have a similar program for undergraduate students.

Our graduate research assistant program started decades ago, long before the concept of affirmative action appeared on the scene. In recent years we have put a gentle affirmative action overlay on this program to increase the participation of women and minorities. We have, I think, achieved good results. During the summer of 1986 we have had two hundred and thirty-two students in our graduate research assistant program, seventy-five or thirty-two percent were women, forty-six or twenty percent were minorities. Quite a

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few of the students from this program eventually joined the laboratory in permanent staff member positions.

I'm a example of that program. I was a graduate research assistant during the summers of 1963, '64 and '65. In those summers I was exposed to good science on real reactor safety projects. Incidentally nuclear reactor safety was of interest to people. That's why I'm in human resources now, and table the work with some very exciting people during those summers. Also I gained a lot of self-confidence in seeing that I could hold my own with students from the great universities such as Berkeley, Rice, MIT and Cal Tech.

Another program that I will discuss is the women in science re-entry program. This is a joint program between the Los Alamos women and science organization, the Los Alamos branch of the University of New Mexico, our laboratory and other technical organizations in Los Alamos. This program was discussed earlier here today during the testimony from the floor by Rosemary Frederickson from EG&G in Los Alamos. I will only elaborate. Re-entry women are those who have been away from the work place for a number of years or who are seeking retraining to escape dead-end jobs. Many are wives of scientists who work in Los Alamos.

The program, which started in 1981, incorporates two years of academic training leading to an associate degree in applied science, combined with an on-the-job internship at

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the laboratory. Participants are paid for their on-the-job work for about twenty hours a week. Participants have ranged in age from twenty-three to fifty-seven. They have come from all occupations, housewives, waitresses, store clerks, secretaries and so on. The laboratories hired thirty-one graduates of this program. About four years ago when I was the leader of a technical group that studies problems associated with international control of nuclear materials, I employed two women as science interns. These women did an outstanding job. My old group continues to participate in this program because it helps them to get their work done and adds diversity to their work force.

The final special program I will discuss is one designed to get more junior and senior high school students interested in science and engineering. The program, which we call careers in science, targets students in the seventh through tenth grades. Teams of three or more scientists and engineers from the laboratory visit schools in the seven northern counties of New Mexico. These employees discuss their careers, what they do on the job and how they got their educations. The focus is to encourage the students to keep taking science and math, an equally important subject which I have heard no one mention here today yet, we encourage English, especially writing. If you can't write, you probably can't do good science.

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Last year a hundred and forty-six laboratory employees, working scientists and engineers made presentations to forty-six schools in northern New Mexico. Contact was made with over seventy-five hundred students, and in some of these schools over two-thirds of the students are minorities. One of my employees, an electronic technician who is a Native American, was a regular participant in this program. He really enjoyed being able to demonstrate some electronic gadgets that he had designed. He also enjoyed being a role model for the Native American students.

This has been a rather fast and brief summary of three of our dozen and a half special programs to increase participation in women and minorities in science and engineering. Our other programs, including those directed toward handicapped employees, are described in the written testimony. In summary, I believe this special employment program in a world-class research organization will succeed if one, they are based on diversity and its importance to good science; two, they become integrated into the day-to-day operations and culture of the organization; and three, they contribute to the real output of the organization. They are not just make work and four, they have acting participation of working scientists and engineers. I thank you for inviting me to participate today. Your work is very important. I hope I contributed something to your efforts. Thank you.

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MR. OAXACA: Thank you, Doctor. Questions, please?

MS. JOSEPH: I compliment you on programs you talked about, and I'm familiar with those that you haven't talked about which are Department of Energy systems, but I would like to ask you something different. Rather than target programs within the laboratory itself, you have sixteen hundred PhD's. One of the problems that we are looking at, we have one subcommittee on R and D itself, and what I would like to know is whether you have a program that is helpful in promoting women, minorities and the handicapped in research programs through partnerships, through mentoring, through some kind of system that does anything special, or whether you take the approach of the best and the brightest will rise to the top if they have what it takes to be on the top?

DOCTOR FOLEY: I think you touched on something I didn't have time to mention, but I think from my viewpoint the next big issue or it's an ongoing issue, but an issue we face is getting the number of women and minorities into leadership positions, increasing those numbers. We have several programs that have been in the laboratory. We have a rather comprehensive management training program that we put on every year for first-line supervisors to give them the skills to move up into management positions. We have several study programs.

As you may know, Los Alamos is a rather isolated

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location, about ninety miles from here up in the mountains. We have developed our own graduate school with the University of New Mexico so people can work toward advanced degrees. We have a couple of bachelor degree programs now and training programs where people can get bachelor degrees while working at the laboratory in electrical engineering, have a master's in management program where several people a year are sent off for long weekends here in New Mexico to get master's degrees in business administration. We have a variety of programs, but I think it's clear to all of us that more attention must be paid. The women and minorities cannot just be the journeyman scientists in an organization. It must be in leadership roles. The sooner we improve that situation, I think the better off we will all be.

MR. OAXACA: Doctor Clutter and then Doctor Adams.

DOCTOR CLUTTER: Actually Tony just asked my question. I'm wondering how many women, minorities and handicapped you had in leadership positions at Los Alamos?

DOCTOR FOLEY: I think in most technical organizations the numbers are still relatively small, but they are increasing. We are seeing the main working organization at the laboratory is called a group, a group to have somewhere between twenty-five and seventy-five technical people. We have several women group leaders now at the laboratory, several women deputy group leaders, so they are moving into

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those positions. We have a few women scientists in division offices, but none at the moment are division leaders. We have had it in the past, but the numbers, as you know, the kinetics of situation even such you increase the numbers in the work force you don't necessarily increase the numbers in the management positions at the same time.

DOCTOR ADAMS: I just want to compliment you. I haven't worked with your laboratory, and I wanted to extoll our group -- if you are not familiar with what the labs are doing, if there's one in your area because of where we are sitting on this committee, I would ask you to spend a day at a lab like that one. They are scattered around the country. They could serve as models. You all have done a marvelous job. They are isolated. We have students who work with you all through the summer. We just had a young man who is just completing -- he's done all his research at the lab from the University of Michigan, should get his PhD, may have finished already.

That's another thing that they have done. You have taken women from diverse kinds of backgrounds. For instance, we had a student who was a chemistry major from Clark University who does not offer engineering. They took that student in the summertime, she went on the University of Washington and has just completed her master's degree, is now working full time. Another one who went through the same situation is studying for a PhD at A and M, so I think, first

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of all, I'm going to say that there's a comfort level there that I just don't see, and I would challenge people like for the Department of Defense and places like that where they do high level. I am talking about this is state of the art scientific research. You are talking about sixteen hundred people who have PhD's, so it means it can happen, but there's an attitude at your place that we do not see at these other kinds of laboratories, so I would think that I just want to add that to that, and what I would say to my colleagues, if you are not familiar with what they are doing so we can sort of come to some grips on what we might ought to be doing or put back in agencies, I would encourage you to spend at least a day at one of those labs.

DOCTOR GRIEGO: I appreciate your comments. Sometimes we feel like no one notices.

MR. OAXACA: I think it's a big facade. I think you guys just want to ski up there in that beautiful country.

MS. BISHOP: I would just like to acknowledge that I am not surprised at your title that has to do with human resources. I'm a PSA, and we do have a human resources council which is dedicated to nurturing exactly that, our most prized possession which is people, employees, and I sense that you are doing the same thing there at Los Alamos. I would also would like to ask, though, for some clarification. You talked about a 1986 work force, seventy-five percent of women

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and some percent of -- was that a work force?

DOCTOR FOLEY: Let me give you those numbers again. This was our graduate research assistants. Two hundred thirty-two students in it last summer to -- last summer at Los Alamos we had two hundred thirty-two graduate students from all over the country. Seventy-five of the two hundred thirty-two were women, this is thirty-two percent. Forty-six were minorities. This program has been going on since probably about, you know, time of Oppenheimer almost. When I was in the program of 1963, '64 and '65 there were about a hundred students in the program. There were small numbers of women and minorities and so we have made a few changes in that.

MS. BISHOP: What's your breakdown on minorities?

DOCTOR FOLEY: We have about twenty-nine percent of the employees at the laboratory minorities and about twenty-nine percent are women. That's correct, within plus or minus percent. I don't remember exact numbers.

MS. BISHOP: Does it stand to reason you are going to have more Hispanics there as part of the minority number?

DOCTOR FOLEY: Yes, no question about that. Yes.

MR. OAXACA: Last question. We are running quite a bit late. Ms. Sabatini.

MS. SABATINI: I just wanted to know, are these programs offered at these regional areas around the country, the women in the retraining programs?

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DOCTOR FOLEY: No. I think these are unique to our little spot on the hill up in northern New Mexico, yes. I think the reason these programs go well, frankly, is that they were generated by some zealot in the organization who felt a need to do that, and those things tend to work good. Bottoms up approaches to these kind of problems if you find the right person work fantastic.

MR. OAXACA: Thank you so much.

DOCTOR FOLEY: Thank you.

MR. OAXACA: Doctor Nancy Felipe Russo, if we could ask you to come up and testify, please. She is professor of psychology and director of women's studies at Arizona State University, which allegedly has a good football team.

DOCTOR RUSSO: Good afternoon. I hope my voice lasts. Those things in the air are all settling right in my head. I want to thank you for this opportunity to address the Task Force, and anticipate in this regional meeting to examine and advance opportunities for women, minorities and disabled persons in science and technology. As you heard, my name is Nancy Felipe Russo. I'm a professor of psychology, and director of women's studies at Arizona State University. For more than a decade, I have been involved in research and policy-related activity related to the advancement of women in science, and I see some old cronies in the room, and I'm very happy to participate in these proceedings.

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In my testimony, and I have seventeen pages plus of appendices which I will not read, I just want to address briefly, highlight, underline some of the areas of your charge, and I will focus on women in science because that's the area of my expertise, but many of the suggestions apply to minority and handicapped men as well. I want to include disabled women and minority women when I say women, so the status of women in science, first the problem. I'm not going to go through it all because you have Betty Vetter, and if anyone has put out statistics on the status and problems of women in science, Betty Vetter has done so. I will just underline a few that I want you to keep in mind.

The underrepresentation, the sex segregation, the underutilization, the salary inequities, the precollege preparation is lacking. I want to expand a little bit on two more of the problems that Betty doesn't have so much data on. One is the stereotypes about females, I should say, inferior abilities. These stereotypes persist and continue to be perpetuated by a variety of things, including the lack of visibility of the contributions of women to science, and further, the limitations of tests such as the SAT to assess scientific achievement and potential are not sufficiently recognized so that differentials in test scores are used to support stereotypes, and Sheila Tobias alluded to some of the negative impact the use of these test scores have had, and I

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expand a little bit about it.

The other issue that I want to highlight is stereotypes without science. Science continues to be stereotyped as a male activity, military applications that are numerous and receive generous funding in rhetoric that promote science to be competitive with other countries really contributes to this macho image of science perpetuates a traditionally masculine stereotype of science. Hand in hand with this goes the valuation of trends of science that have large proportions of women. Some of those aren't even considered real science at times. The arrogance, the status differential within science or the arrogance has attracted to, and the continuing argument over the support for the behavioral and social sciences in federal funding cases as is the case in point. Ironically it is the social and behavior science that create the knowledge base that is necessary to matriculate women of -- women, minorities and handicapped in science and to evaluate programs that are developed to address them. So I was told to concentrate on exemplary programs.

What I would like to do is to just highlight some of the programs that we have in Arizona. I would like to say, though, given the complex psychological, social and cultural forces that create barriers to women in participation in scientific careers, a diversity of approaches is needed. You are not going to get one quick fix here. You need up-to-date

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career information, you need approved career counseling, math and science curriculum. Both students and faculty, after you educate them, you have got to keep them. Re-entry programs and public awareness programs, media campaigns. I have to say, if it hasn't been said before, that science cannot be an island of equal opportunity in the midst of a society that appears to be backing away from its commitment to equal opportunity. We mingle such things as Title 9 in the Civil Rights Act.

For example, as implications for the nation's ability to fully develop the scientific potential, the citizenship -- as long as women have a disadvantage status in society, women scientists will also be at a disadvantage and there will be a disproportionate number of little girls who will not have the opportunity to fulfill their scientific potential. So let me focus on some exemplary programs that might provide some useful insights for ways to increase participation in status of women and minorities in science.

One thing I wanted to tell you about was the Hispanic mother-daughter project at Arizona State University. You may have known, by your statistics that you have been barraged with, Hispanic women have the lowest educational attainment of any of the ethnic groups with the exception of maybe Native Americans with fifty-two point seven percent of Hispanics twenty-five and over failing to complete high

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school. In 1985 more than one in two Hispanic women over age twenty-five didn't complete high school. Strategies for increasing educational attainment of Hispanic women are critical obviously for the participation in science. And we have a Hispanic mother and daughter project that provides a model program for doing so, and prepare Hispanic women for higher education and professional careers, to increase the number of Hispanic women attending college and completing the baccalaureate programs.

It starts out with eighth-grade girls, begins on the mother-daughter relationship and preparing these young women for higher education and to pursue their aspirations. The focus is on careers in business and in technology, and although one might say that's not specifically focusing on science I think the project is a program that could do so. Basically what it involves ia anually recruiting sixty mother-daughter teams and providing them with workshops and other experience that help the girls develop the skills necessary for success and higher education, so both mother and daughter come to college from the eighth grade.

In addition, the project provides career information and assessment to stimulate early planning for higher education, so both daughters and mother come to college, participate in higher education activities, and become involved, and we now start in force so there are now --

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some of the two groups are now in high school and now we have a new program in the high school phase providing assistance with academics for girls who are taking college preparatory classes. Each participating high school has designated a sponsor to the teacher counsellor that meets with the girls on a regular basis and staff with coordination of activities for the girls.

The university has Hispanic undergraduates that have been hired as tutors to help the girls with their English, the math and science classes. You can see this provides employment for the college students, it provides help for the girls. High school girls will be matched with professional women and visit their place of business and orientation to particular work environment, and in addition to the remarks I have here I have an article about the program. That's attached to my testimony. So that's one kind of very intense program. I gave a lecture to one of the girls, to one of the groups on stress management, and you can imagine having eight pairs of mothers and daughters coming out at eight o'clock at night on a weekday and all interested. I was really impressed with the enthusiasm that they have for learning whatever they can.

So another example of an important program in Arizona is the Women in Science and Engineering Office of Women Studies, the WISE office, of the Southwest Institute for

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Research on Women of the University of Arizona. Now, the University of Arizona and Arizona State University are rivals in many things, but the women's studies cooperates. The WISE office was established in 1976 and was designed to create an environment to encourage the young assessing careers in science and engineering, and to establish an outreach program that encourages junior high school and high school students to pursue education and career opportunities in science and engineering. They have a WISE handbook, "Opportunities for Women in Science and Engineering," that is distributed to precollege students throughout Arizona. They have an annual conference now in its fifth year, called "Expanding Your Horizons for Girls in Junior High and High School," and they also have a training program for college women titled, "Coping with Computers," which provides college women with no or negative computer experience, a basic introduction to computers and other computer related information. Additional testimony on WISE is also attached to my testimony. I have also attached an article about equity in computer based education that identifies a variety of success programs, because the inequities in a computer education is somethhing that I really think you need to look at.

I hear the bell, so I will come to a close. I do talk about the re-entry program for women at SASU, but you have heard about re-entry programs and in my testimony I also

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mention our desire to develop special courses and lecture series that will educate the public as well as our students about the way that gender and values affect not only the status of women in science, but the research questions and the goals the scientific -- the scientific enterprise has, and so I discuss a considerable amount of those kinds of activities.

I do want to close, though, on a final last thing because I was asked to identify new and innovative programs, and I think there is much to be done and the important thing I would like to underscore is the need for a long-term perspective. Also it's worthwhile to search for new and innovative ideas, and it is important to identify new issues that develop. The nature of the plan is such that old effective strategies such as career information and workshops, scholarships and fellowships, special institutes and courses and internship programs continue to be needed with each new generation of potential scientists, and it's a society that produces funding has, achieving that sustained commitment that is needed to alleviate the disadvantaged status of women in science will require an extraordinary effort. They are to be commended for building that up. Thank you.

MR. OAXACA: Questions?

MS. WINKLER: This may really be a hard one for you to answer, but if you were to say -- do you have any sense of at what age a girl decides she is going to go into science or

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not? Is it something that happens when you are a child? Is it when you are in high school? Is it when you are an undergraduate?

DOCTOR RUSSO: I think that it's important not to impose a decision making model on little girls. When you ask a five-year-old what they want to do, the boy will say he wants to be a fireman, and the girl will say she wants to be a mother. Then they grow older, the career choices and strategies evolve. The important thing about little boys and little girls is that little boys maximize their options. Little girls' options become so constricted they don't take math and science in the early years. Then later the way they structure their educational system, you can't get those experiences unless you go back, quote, "go back," and as Sheila Tobias points out, it's not that you are not able to learn at a later age, but until recently it's been very difficult for older people to come back and overcome both psychological and social barriers in our educational and training institutions that were designed to train eighteen-year-olds.

MS. WINKLER: But do you think -- maybe it's unfair. Do you think that, for example, do a lot of people get sort of struck when they are in college that -- this may be not just women, it may be everyone -- that that's when they kind of decide or is that a decision that you make while you are

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choosing your high school courses? I'm really interested in this mother-daughter program, and I wondered, I am sure it does open up more options -- I'm wondering at what point is the girl actually making that choice?

DOCTOR RUSSO: I guess what I am resisting is saying that a choice is made early and kept to forever. You choose to be in college prep, and then you choose to go on to college, and it's kind of a narrowing as opposed to here's the choice and the goal and I'm working toward it. Now, the fact that you're shaped and you have attitudes toward science and you don't think it's something for you affects the kinds of choices you make, and one of the things that has been a longstanding finding is that when you ask women who work in science what were some of their early experiences that led them to go in science, the experience of working in a laboratory and knowing women scientists was real important. I remember you talk about these science fairs, you are going to have these science fairs, but it's real important to have judges that are women.

I was a judge at a Westinghouse International Science Fair, and I will never forget. The girls would say, "Look" -- and I remember she was from Texas -- "Look at that. You are a woman judge," and it just struck me that, yeah, sure, why not? But to them it meant more than anything that there was a woman there who was a judge, so those fairs, there's a lot of ways those fairs get messages.

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DOCTOR CLIVE: I appreciate if you could elaborate on your last remarks as you closed your statement because I was struck by the figures you gave, sixty or eighty pairs of mothers and daughters. It sounds like a drop in the bucket, and I was reading on the plane coming out about a very well-regarded program in Philadelphia that attempts to help minorities in science, and at the end it said it hits only three percent of the potential target audience. My perception is that we have dozens and dozens of exemplary programs, and they are just making the tiniest scratch in the problem, and what do you think could be done? What needs to be done in your estimation to pump these programs up to where they can begin to make a dent rather than a scratch?

DOCTOR RUSSO: Well, see, I don't believe that the impact of that program is only on the girls. I think that if you can get sixty girls from the eighth grade who are going to go to college, that they are a critical mass of girls who will affect other girls in the eighth grade, that they provide a change in the atmosphere and in the community of that high school. I don't have data to support that, but I truly believe that the impact of these programs is beyond the people in it. Now, obviously it would be better to have a hundred and twenty, two hundred, four hundred girls. It would be better if we could have more funding for these programs, to have more training sessions.

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We have to understand that especially when you are dealing with first-generation college -- I don't know how many people are first-generation college. I'm first-generation college. It is very difficult when you go off to college to deal with the issues of leaving your family, to learn new forms and values and to feel that you have to somehow choose between your familiar identity and the new professional identity, a program that will try to intervene in that conflict and have family and first-generation people go together is real important. Second generation won't matter so much.

MR. OAXACA: Thank you very much. Thank you for your testimony. I would like to ask the gentleman that hosted that wonderful reception last night along with his two torpedos, Herb Fernandez and Mike Rios, and the rest of the wonderful people here at Albuquerque, Doctor Henry J. Casso of Project Uplift.

DOCTOR CASSO: Thank you, Mr. Chairman. I have a handout because we can't use this here because of the position of each of you. Our work-study student here will pass them out, please, to each of the members of the Task Force.

MR. OAXACA: What we might do, it's a long afternoon. We have had lunch. How about a seventh-inning stretch for about thirty seconds.

(THEREUPON, the proceedings were in recess.)

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DOCTOR CASSO: Thank you, Mr. Chairman. I'm very pleased for this opportunity to share a number of activities that my institute is developing under the auspices of Project W. I won't read my full text. It's being made available for you, but basically where I came out of was a major study for the State of New Mexico comparative study of higher education, and realized at that time that the developing institutions, schools, colleges and universities were developing people for what has been and what is rather than what was coming, and so I decided to create this institute and to look down the road on earth and space and see what careers are coming and what can we do about it.

The second major decision in my life was to develop and pull back from the national scene, and to develop a state prototype, and the prototype that we have developed is under the auspices of Project Uplift towards high technology preparedness in New Mexico. The underpinnings of Project Uplift will be, this is a state prototype for high technology career preparedness, our efforts are comprehensive in that all key players are involved, the legislature, the state Department of Education, the state Department of Labor, JTPA, the universities, the national laboratories, major facilities, industry, especially the high technology employers will have a very vested interest in the caliber of the work force and especially the largest and third largest air base in the

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world, Kirtland Air Force Base.

A major test that we are trying to probe is how do you take a major defense facility like Kirtland Air Force Base with its subcontractors and help a state prepare its young people for high technology careers. With two caveats, number one, avoid the reason for the technology development, namely defense and war, and number two, the participation be reflective of the population mix. In 1979, 1978, I have tried to get the legislature to fund MESA here, math, engineering, science achievement, and we began to get the reticence of that time towards the funding through state dollars of anything dealing with one particular target group, so we developed the notion and reflective of the population mix so that all activities, and the five that we will outline today, combine that particular policy and strategy.

Project Uplift has a focus in these areas, high technology careers, careers impacted by high technology, the development of shapers of the space and information age, the space stations and its implications for careers, and the space age and its implications for careers, and that is the reason in your packet we gave you the first poster that we will put together because it talks about the twelve billion dollar commitment of the country of the space station, and on the side here you see the four elements.

The second item we are going to talk about here,

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namely the youth high technology preparedness youth institute. Included also in your packet is a -- I hope to throw this on the screen, but we can't because you won't be able to see it, is this little booklet here, and there is a pile chart here to speak of that comprehensive plan that we are striving to develop, and the five items that I am going to refer to now are included there.

First of all, I am very pleased to state that we developed a hundred and two half-hour ABC affiliate statewide television programs on the subject of high technology career preparedness in New Mexico, and our last program on Sunday we are very pleased to have a member of your Task Force to speak about the lead-in's to why the Task Force, chiefly because of Work Force 2000 booklet and the booklet on the earth, and then the expectations and outcomes of this particular body.

Secondly, we have the high technology career preparedness youth institute, which this document here shows you what's involved. With this years institute aim, we will have had one thousand high school students and school personnel from seventy-seven of the eighty-eight school districts in cooperation with the Air Force, Kirtland Air Force Base, the Space Technology Center, the Air Force Weapons Laboratory, Sandia National Laboratory and with the high technology contractors that relate to them out there. Inside you will see the various patrons and sponsors and so forth of

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that particular activity.

By the way, each student that participates is charged and challenged to go back to their respective communities and to make an impact with the information, whether it's to the school board, school classes, whatever, with their particular information. A number of them have gone down into the elementary and to the middle schools. The third in conjunction with this, and as you saw in that poster you have there we are getting ready for now our fifth space technology career exposition. With this year's -- with last year's fourth of this type, we have had over ten thousand participants that have gone through to see these very live exhibits that are provided by corporations and various other entities that are looking for and need technical personnel.

We also have developed this year an invitation of students and the chambers of commerce from Juarez and Chihauhau and with an invitation to Guadalajara, and that is part of our commitment as you will hear me talk about the development of hemispheric people in order to be able to show our young people that are in this region that their careers can be applied throughout the hemisphere, not just in Albuquerque and New Mexico or in the sunbelt.

Some of the outcomes, and they are in the report that I will give you, but it's very interesting to see that we saw the creation of the Hall of Academic Achievement in

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Moriarty High School. In Carrizozo they added a third year of math as a result of the student going back. We saw presentations of the school board in Gallup School District. We saw three students last year make major presentations to eighteen hundred high school colleagues of theirs at Eldorado High School here in Albuquerque.

The key to the success, we believe, is the type of funding. We believe no one entity should fund everything of anything we do. It should be a collaborative venture because we all have a vested interest, Congressman Manuel Lujan is our honorary chairperson of the Youth Institute and Space Technology Institute. The New Mexico legislature puts in a third, and at a time when they are cutting back on everything else and higher education and public education, they have continued consistently to fund our participation. The national corporation, the labor foundations, and the participating school districts, the universities and the Aerospace Contractors' Association. That's very critical because as all of us know the aerospace corporations, many of them are working on means to improve and work on a positive image. This allows them that particular outlet.

The fourth thing that we do is we create -- because there was a gap in the last three institutes between the male and the female participation, the males, the female -- there were more males than females and that was growing. We

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developed the Rio Grande Research Corridor High Technology Career Preparedness Minorities on Youth Institute. Over a nine hundred mile sight visitation, briefings and meeting role models from the governor to the supreme court justice to the presidents of school boards to the presidents of universities, and briefings on the universities about what they do, how do I get in and exhibits, how to get into the university, what are the strengths of the university, what they should be looking for, and we are very pleased that this year of the eighty participants, sixty of them were so-called economically disadvantaged, but we involved the twenty-two -- twelve of the area offices of the Department of Labor, and as a result, ninety-five percent of these young minority students, male and female, want to pursue higher education.

They come from twenty-two different counties, and they come from thirty-five different communities and small towns and rural areas in the State of New Mexico. Above all, it's for the -- pursuant to the question that came here earlier, this is the first time in my ten years of efforts that there were more female than males that participated through no artificial means but other than recommending the policy out there in those twenty-two communities.

Now, we included some of the statements of some of those students to say the tremendous transformation that's taken place in these young people, and they are part of the

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record. If you want to ask a question, I will be glad to use your time to give you one or two of them, and finally after a decade of work and after we traveled for the second year on this nine hundred mile briefing and sight visitation to the world's most advanced research and development, New Mexico is the second state only to California in SDI contracts, we didn't see New Mexicans in any significant number. Not just minorities or women, just the sons and daughters of the state.

So I was convinced to have what is called the creation of the first Rio Grande High Technology Minority Job Fair, which we did last year and this is it. You will see some of your agencies that are there, those of your agencies that are not there. Some forty-five of them came. The Department of Energy gave us a program. Anheiser-Busch participated in the libations and the corporate lunch, and as a result of this, working in close collaboration with Kirtland Air Force Base and working in close collaboration with the Office of Personnel Management, the Department of Energy -- over one hundred jobs were offered to three hundred select students from a consortium of the sixty degree granting institutions on this corridor, including UTEP.

In this corridor is the highest percentage of minority technical students in the United States, so we developed the consortium, and I'm happy to say that it was the unanimous agreement of all that participated that we hold a

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second one and we are, and we have here a representative of the Office of Personnel Management who's on the staff of one of your members who was unable to make it. They have agreed because of the success of last year, they used this model as a model throughout the United States, and they are recruiting and secondly, will be the major federal sponsor for the February job fair.

Some observations, I am only going to give the key points. I think a state-wide systematic approach is doable and it is recommended. However, it's difficult and complex. Secondly, I think the state legislature is willing to support an activity like this if it is statewide and they can see the benefits for the population mix around the state, and third, there is a great challenge of getting current information to small towns in the rural areas. We heard that question this morning. There is institutional and community lack of excitement as to the state and national purpose in preparing the technical work force. There's a lack of institutional accountability. People go in and whether they come out or not, people could care less and continue to fund them, and there's a need for the use of successful minority and female role models. We heard that constantly. That was one of the exciting features in everything that we have done thus far, and there's a lack of current information on the resources and strengths of the colleges and universities, especially in

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small towns in rural areas.

I have one minute and I have few recommendations. First of all, I notice you do not have on your Task Force a member of the Department of Labor in the YTPA. They are mandated to do what we are talking about, and I think you ought to, one, make sure they get represented and then two, hear their testimony. Number two, I think we need to develop an urgency for the development of hemispheric people so that our young people can see purpose in the hemisphere rather than just in their small town and in their small community. Three, I think federal research projects should give points to those universities and colleges who have successful projects for the attraction, retension and graduation of minorities, women and handicapped in science and technology degrees. Four, the national space programs need to increase the minority role models in its various programs, and I regret that the woman who heads up the teacher program in space is not with us. Six, with a track record of state-wide television programs, my institute would be disposed with your support to the development of a national series on high technology career preparedness. Congressman Manuel Lujan has urged this. Your Chairman is recommending we do it. We would do it if we are encouraged. We think it's needed because the textbooks change so dramatically and the current information becomes obsolete in such a short period of time.

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I urge your support for the proposition of a major defense facility and how it can help a state prepare young people for high technology careers. We are currently working on a plan. I gave a white paper here to Ms. Griego to invite the commanders of the major defense facilities of the United States to come to New Mexico and see these five things that we have done to see if they can be transportable to their respective communities, and lot of the reason is a lot of defense dollars go into these facilities. They are willing -- if they are willing to collaborate, and finally I think there should be support for statewide high technology preparedness projects through research grants to determine the impact analysis of those factors which can be replicated in other states and developing countries. The reason I say that is our first graduates of the youth institute will be coming out this coming May, and we think it would be very instructive for us to take a look at that and to see what we have learned and what we can pass onto other communities. Thank you very much.

MR. OAXACA: Thank you. Questions for Doctor Casso?

MS. BISHOP: I may have missed it. How long has this Project Uplift been in existence?

DOCTOR CASSO: Our total effort has been ten years, and these since 1979.

MS. BISHOP: Have you done any follow-up to determine once you motivate the students how far have they traveled the

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road?

DOCTOR CASSO: As I say, our first graduates are coming out this coming May, and we are putting together the resources in order to be able to do a comprehensive analysis of that. In fact, this is one of the recommendations if we can get the support. We have not been very fortunate to get too much out of the National Science Foundation, but they would be a very appropriate group to do that.

MR. FERNANDEZ: You asked -- I want to turn a question you asked me Sunday around and ask you the same question. Since we started thinking about the statewide plan back in '75, '76, in your estimation, what has changed in the New Mexico environment in the promotion of education of minorities, women, handicapped for science and technology?

DOCTOR CASSO: Well, first of all, I think the overall environment shift is New Mexico's realization that as we look at economic development there is a need for the development of many resources. I think that admission is very critical as an underpinning of what we need to follow.

Secondly, from where I sit in dealing with the legislature and dealing for, you know, when you are going for the hard dollars and competition with higher education, public education and everything else, they are receptive, they are still wondering as to why we need to use specialized efforts like this and not the system.

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The third, I think that I am finding that in some communities they are more responsive to the policy of the participation reflective of the population mix. However, I didn't bring a copy, but it's a four-hundred page document that the National Science Foundation funded with Rockwell International Science Center and my institute, and no one has been interested in that, not even in the National Science Foundation. As to your question, what happened to that document, and we went from, you know, from birth to death, you know, the whole business, four hundred pages, a beautiful plan.

MR. OAXACA: That's what killed it. It was four hundred pages.

DOCTOR DANEK: What was the title of that?

DOCTOR CASSO: "A State Plan for Hispanics and Native Americans in Science and Technology Professions." I will be glad to send it to you. It's a unique document.

MS. WALTER: I really applaud your program. It sounds like you are doing wonderful things here. I was really glad to hear you address the issue of funding. We have heard a lot about that today, the need for additional funding. You stress that you thought collaborative funding was essential. I wonder how much -- you are approaching the private sector, how much the private sector is contributing to the funding, and do you have any suggestions as to how we approach the private

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sector for more contribution rather than looking to public funding for it?

DOCTOR CASSO: If you look within this document, it shows you the various corporations that have participated, and the bottom line for them is what returns are you getting, and who else is participating, and once they see the legislature putting in its funds, that's a very key. Getting those few dollars from the legislature is a pain in the proverbials. I mean, you lose ten or fifteen pounds. However, what it signals to the schools and to the corporations is, you know, it's worth the effort.

MR. OAXACA: Thank you very much for your testimony, and once again for your wonderful hospitality. Ms. Connie Alexander, administrator of employee assistance program of Lyndon B. Johnson Space Center of NASA, Houston, Texas.

MS. ALEXANDER: My dog feels like she has enjoyed about as much of this as she can stand. She thought perhaps she could intimidate me into leaving just now. My name is Connie Alexander. I am the administrator of the employee assistance program for NASA at Johnson Space Center, and I would like to thank you very much for the opportunity to address you, although to be perfectly honest, I'm not at all certain to what I owe this opportunity. I am a psychotherapist, and I deal with our employees and their family members, and our contracting employees and their family members concerning

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their personal problems. I'm in no way connected with the equal employment opportunity office or personnel. I'm part of the medical sciences division, the medical operations branch. I am a separate section of our flight medicine clinic.

My suspicion is that perhaps one of the reasons why I was invited, or I was actually given marching orders is what it amounts to, those of you who have worked for the federal government I'm sure understand that. I think the reason why I was asked to attend the meeting and to testify is because, number one, I can't bore you with statistics and numbers because I don't know any. The EEO people and personnel people know all of that, and it was fairly clear that this Task Force did not want that. Also, I come in contact with a great many employees on an informal basis. Just chit-chatting around the center, and many of our employees, of course, make appointments and come to me and talk with me about their personal problems. I see a cross section of our employees, male, female, minority, some employees who have disabilities and I pretty much know what's going on around our center, and I think perhaps it was the idea that I could give you more of a layperson's account of what is happening at the Johnson Space Center in terms of attracting women, minorities and persons with disabilities into scientific careers.

In the past almost eight years that I have been at the Johnson Space Center, I have seen a significant increase

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in the numbers of women, minorities and persons with disabilities advance to the journey level. That's the grade level thirteens and fourteens. Fifteens are generally reserved for management and then, of course, we have the senior executive service which is our very top management, our directors, and I have seen a significant increase in the numbers of women minorities and handicapped individuals advancing to those journey levels. As far as our senior executive service, we have one woman who is the director of space and life sciences, and we have one minority who is also on our center of director's staff, and I also believe that I am seeing -- and the women who come to my office, I believe that I am seeing women, minorities and handicapped individuals, particularly women and minorities, achieving on a competitive level now, certainly many fewer token positions than I was seeing when I first came to the center.

And indeed, my suspicion was early on that perhaps I might have been one of those, and I suspect that to some of the other employees and our managers, perhaps they viewed me in that way, and I must admit that it has been a long hard pull for me to dispel the myth that I am a token employee regardless of whatever disability I might have. That's totally incidental. I was not hired because of it, but in spite of it.

In terms of recruitment, I hear our EEO people and

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our personnel people talking about recruiting nationally, and of course, because we are on the cutting edge of technology, it's very important for us to get the very finest -- the best trained individuals that we can get for the positions at the Johnson Space Center, and I know that they make a special effort to recruit into colleges and universities which have large populations -- special populations, and I also know that they recruit in Puerto Rico. A very good friend of mine is the coordinator of the Federal Hispanic Program, and I am often very jealous of her because she is going to Puerto Rico and I'm not.

I would like to say just briefly in terms, and this applies more to individuals with disabilities than anything else, and that has to do with the facilities of Johnson Space Center. Our center, although it is -- well, let's see, I think the first buildings opened in early January, '74 -- '64, I beg your pardon, as I recall, and then gradually more and more buildings opened in the months to come, so for a center that is twenty-five years old almost, our center is mostly accessible and barrier free. Modifications have been made so that for the most part our center is accessible. We have curve cuts, we have ramps, we have lowered elevator panels and of course, these are all important to individuals with disabilities, and makes our center attractive to them as a place to work.

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I think in terms of a broader view, one of the most important things I believe we do is have our center open for visitors every day of the year except Christmas Day, and we have tour guides who are available to help them out and explain the displays, show them the buildings, where to go, how to crawl through the mock-ups, the life size mock-ups and take them into mission control, but I think it is perhaps even more important that we have a very extensive and active speakers bureau where NASA is willing, Johnson Space Center is willing to allow us to go out to all of the world, as a matter of fact, to make speeches, to make ourselves role models, and many of our young women engineers participate in the speakers bureau and go all over the country and even abroad in an attempt to interest young women, minorities and individuals with disabilities in scientific careers. Thank you again for inviting me.

MR. OAXACA: Thank you so much. Questions?

DOCTOR CLUTTER: You say that you're employed as a psychotherapist at Johnson Space Center, and you say that you have seen more women and minorities in journey-level jobs these days than heretofore. Do you notice an increasing amount of stress on these people as they move up?

MS. ALEXANDER: Yes, I do, particularly younger women. We do have a few women minority and handicapped professionals who are, say, in their -- in the thirty-five plus degree

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range, but most of the women, minorities and handicapped professionals are much younger than that, and it's very exciting to me in a sense to work with them, and it's exciting to know that I am entering some of them, but I do see a great deal of stress. I see a great deal of stress, and I think that Nina Kay mentioned something when she was talking about harassment. I see a number of our young women and minority engineers, in particular, and scientists who come to me and say, you know, these men, God they have been around for twenty, twenty-five years, they are not taking me seriously, and I believe I agree with Nina that that is a form of harassment, but yes, a great deal of stress but also a great deal, a tremendous sense of accomplishment and excitement.

MR. OAXACA: Thank you very much for your testimony. I would like to ask Ms. Barbara Torres, vice-president of BDM Corporation.

MS. TORRES: Thank you. Members of the Task Force, I want to thank you for this opportunity to appear before you to present my observations and views on women and minorities in science and technology, and to present some information on some existing and planned programs in this area. Allow me first to introduce myself and tell you a little bit about my background in order to provide a setting for the observations and my recommendations regarding this topic. I'm Barbara Torres. I'm a scientist and a corporate executive and an

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active participant in the community, and what that really means is it's close to impossible for me to say no, especially if it addresses education, science in engineering education. In particular, if it makes it possible for the Task Force to have more good engineers and scientists, if it advances technology and science in New Mexico, and if the organization or the project intends to promote career opportunities for women and minorities in any field.

I received my master's degree in physics from the University of New Mexico in 1972. I worked for the Air Force Weapons Laboratory. I have a small R and D firm and have taught mathematics in the Albuquerque Public Schools. In the professional and technical services industry, I have worked at EG&G and at Mission Research Corporation before joining BDM in 1978. In 1985 I was made an executive of the corporation, and last year was named senior executive vice-president. My recent and present involvement in noncorporate activities that are pertinent to the interest of this Task Force include the State of New Mexico Science and Technology Advisory Commission for 1983 until early this year, the New Mexico Network for Women and Science and Engineering, three years as a board member and president-elect for the coming year. A nine-year member of the American Businesswomen's Association, and technical advisory committee for New Mexico Highlands University, minority technical center of excellence.

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My interest in education, science and technology has grown out of my needs as an employer. The interest focuses towards women because I believe that I have an ability to provide appropriate advice and to serve as a role model. My interests in minorities has normally evolved from the involvement in education in New Mexico, and from the expectations of the people that I work with. As an employer, I have found that it's difficult to find enough qualified people in science and engineering and mathematics, and this is even more pronounced among women and minorities. Women, Blacks, Hispanics and Native Americans are not entering science and technology in proportion to their numbers in the general population. In order to change this, we need to know why this is happening.

I wish I had the answer. I don't, but I do have observations, opinions, and experiences which I would like to share with you. I believe I know what makes a -- will make a difference are people. The people who motivate, who educate, train, recruit, hire, challenge, promote and in general provide opportunities for talented individuals. The people who recognize that there are problems and go about doing something about them, the people who don't make excuses but find explanations and go about changing things. The possible explanations for the low entry of minorities and women into scientific disciplines that I am going to address now are

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based on my observations and reasoning, not on extensive data gathering and not on surveys. I do believe, however, that they are realistic and deserve attention.

Much of the population of New Mexico is educated in rural school districts, many of which have large minority enrollments. The teachers in these rural districts are dedicated, but may be unprepared to offer the foundation in science that is required to generate the interests, the confidence and the capability to proceed after high school. Another factor may be tradition. Many of the students in these rural communities see themselves remaining in the community or returning to the community after college. In addition, believe it or not, the female students are still not encouraged, and in fact, sometimes discouraged from pursuing nontraditional careers by their families, by their teachers and by their counselors.

The situation is similar, although not as severe, for women and minorities in the urban school systems. By the time these students enter high school, they need to realize that certain courses are needed if they are to be prepared for a scientific field of study in college. However, teachers and counselors in the mid-schools are unlikely to be science advocates or to be aware of the need to sensitize the students to the requirements and to be able to instill confidence and encourage enrollments in science and mathematics classes.

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Later when these intelligent and talented students realize that it's going to take an extra year or two to obtain a technical degree, they frequently decide against a career in science.

Another factor that influences career choice is the potential for reward, finances, recognition, contributions to society. The rewards for women and minorities in science and technology have not been obvious. The percentage of women and minorities in senior technical or technical management positions is even less than that in the science careers. In preparing for this testimony, I discovered that industry does quite a bit to promote science and technology as a career field. At the same time, we do quite a bit to promote women and minorities. For the most part, however, industry support for women and minorities and activities within industry to encourage participation in science and technology have proceeded as two distinct and separate assaults. There are some exceptions such as scholarships earmarked for women engineers, direct mailing of employment opportunities to subscribers, to minority and female publications, attendance at minority conferences, job fairs, career days, and support of specific organization usually advocated from the inside by employees or from the outside by the local community.

I would like to describe some specific activities with which I am involved. The organizations are the New

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Mexico Network for Women in Science and Engineering and New Mexico Highlands University School of Science and Technology. The network was formed in May, 1979 for the purpose of encouraging women to enter and succeed in nontraditional careers with an emphasis on science and technology. Activities concentrate on students from the mid-school through graduate level, on women desiring to enter or resume scientific careers, and on the practicing scientist, mathematicians and engineers.

These activities include expanding your horizon conferences at locations through New Mexico in grades eight through twelve, annual meeting and technical symposium for the professionals, local chapter meetings in the Las Cruces, Alamogordo, Albuquerque area and the Los Alamos area five or six times a year, creation and dispersal of career-related literature for students and awards to outstanding exhibits by women in junior and senior categories at the New Mexico State Science and Engineering Fair. The network has held more than forty expanding new horizon conferences statewide. The goal is to reach the students early in their education to allow them to prepare for mathematics based careers. The network provides career information to the participants, their parents, teachers, and counselors, and provides role models of successful women scientists, engineers, managers and others in nontraditional careers.

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One intent is to awaken the students' curiosity in science. Another is to give practical advice and for professionals to share life and career opportunities through workshops and panel discussions. An adult program is also provided to discuss the job market and to suggest ways to help the students prepare for nontraditional careers. Some of the conferences are held outside the main population centers in order to reach out to the rural and minority students who rarely have an opportunity to meet a professional, much less a female professional in science and technology. The next one is October 9th in Portales, New Mexico. Each year the network holds an annual meeting and technical symposium. In addition to conducting the business of the network, this gathering provides opportunity for both normal and informal networking, and it provides a forum to share research and technology information and to go address special issues of general interest to women in nontraditional careers.

Moving on to Highlands University, the School of Science and Technology at New Mexico Highlands under the leadership of fairly new university president Doctor Gilbert Sanchez, is presently undertaking a planning activity to establish technical centers of excellence at the university. They have set about to rebuild the research and scholarly aspects of the university. The planning activity for a minority research center of excellence is still in the early

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stages. The university is considering centers that will perform by medical research and basic research on southwest eco systems.

Highlands is located in northeast New Mexico and predominantly Hispanic area. Activities to date in this planning have seriously addressed the issues associated with the bringing of minorities into the sciences. They would like to be able to establish a resource center that would support the technical research areas and serve the community. It would work very closely with the local regional high schools, the teachers, counselors, parents, students, and serve as an interface between the researchers and the community. The goal is to develop a scientific center of excellence that will attract and provide research opportunities for minority students. Activity is now only in the planning stage, and little more detail can be provided.

In conclusion, the low number of women and minorities employed in science and technology is partially due to the low number that entered the field as a result of lack of preparation from high school for mathematics based careers. To remedy this, we need to address the mid-high school opportunity and the individual who would change careers. There are special challenges to industry, national laboratories, universities, communities and federal agencies in addressing this. An effort on the part of industry and

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other organizations to bring together those activities in support of women and minorities and those that promote careers in science and technology would result in progress. Cooperative activity among secondary schools, universities, national laboratories, industry and science professionals such as that demonstrated by Project Uplift and that demonstrated in the work of the New Mexico Network for Women in Science and Engineering can contribute immensely to increased participation and growth opportunities within science and technology for women and minorities. Organizations respond to external and internal pressures. The kind of focus that's being provided by this Task Force is needed, and hopefully will result in increased emphasis by the entire scientific community on attracting and employing women and minorities in science and technology. Thank you again for the opportunity to speak before you.

MR. OAXACA: Thank you so much. Questions, please? Thank you so much for your comments.

MR. OAXACA: Doctor Leo Gomez of the Sandia National Laboratory.

MR. GOMEZ: Good afternoon. My name is Leo Gomez. I'm employed as a radiation biologist by the Sandia National Laboratories here in Albuquerque. For those of you who may not be familiar with the laboratory, Sandia is the largest Department of Energy laboratory in the United States. It's

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operated by Western Electric on a nonprofit basis for the Department of Energy. It has approximately eight thousand four hundred employees, and a budget of about one billion dollars a year or about one dollar out of every thousand spent by the federal government is spent at Sandia. I have been concerned with adequate representation of women, minorities and the handicapped in the science for many years. I served on the board of directors of the Society for the Advancement of Chicanos and Native Americans in Science, the affirmative action committee of the Health, Physics Society and the committee of opportunities in science of the American Association for the Advancement of Science. I have also presented talks on science to public school opportunities from elementary school through high school for many years. In addition, I have judged science fairs at schools with predominantly minority enrollments.

Today I would like to comment on the impacts that the Department of Defense Authorization Act of 1986 has had on the ability of federal contractors, government-owned contractor-operated labs, such as Sandia, to support activities designed to inform female, minority and handicapped students about opportunities in science. Since the Defense Authorization Act prohibits contributions and donations by the government-owned contractor-operated labs to noncharitable organizations, I have been informed that those federal

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contractors can no longer support educational activities for the minority, female, handicapped students in the public school system. As an example, the mathematics engineering science achievement program which is administered by the University of New Mexico for New Mexico high school opportunities receives no financial support from Sandia any longer. Providing in kind services such as printing and technical art support to noncharitable organizations has been substantially reduced as a result of the act. Also, educational scholarships to assist minorities, females and handicapped students have been eliminated.

Since tomorrow's scientists are today's students, I feel that the federal contractor, such as Sandia, should be able to assist in affirmative action activities in the public schools. This involvement could include the following, A, direct financial support to a specific educational activity; B, equipment loans or donations. For example, personal computers, calculators, word processors. Right now many such items are disposed of through the Sandia reclamation department rather than being provided to schools. C, providing tutors from the technical staff during school hours. This isn't that we wouldn't like to do it on a volunteer basis after hours, but many target students have jobs, participate in sports or for other reasons cannot participate in out-of-hours school programs. D, providing assistance to public

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schools and technical schools to enhance their curriculum. If they are teaching things that are no longer technical quality, those things could be corrected if the advice were provided.

I believe that this list I just gave is what this morning Mr. Matthews called promoting access into science. Community outreach activities which reach the minority, female and handicapped organizations should be fostered. These activities can assist the community in informing the students of opportunities and needs in science. Sandia National Laboratories is very important to Albuquerque and to New Mexico in many ways. I feel that Sandia and other federal contractors should be able to assist their communities in increasing the numbers of underrepresented students in science and technology. In my opinion, legislation such as the Defense Authorization Act of 1986 has the effect of discouraging federal contractors from expanding existing programs or creating new programs which, for example, would provide employment for underrepresented students during the summer.

Other programs which can be -- which may be affected are programs for summer employment of minority school faculty and programs which allow laboratory technical staff to teach at minority schools. I think that legislation should encourage rather than discourage federal contractors from participating in educational alliance of minority colleges and

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universities. The United States gains tremendously when the talents of all its citizens are fully developed. As a minority scientist, I'm willing to help in any way that I can to increase the participation of underrepresented students in science and technology. If Doctor Adams were still here, I would ask him to please take the message to Congress that its legislation should help and not hinder the opportunities of all its citizens. I thank you for the opportunity to testify.

MR. OAXACA: Thank you very much. We would sure like the salient points of that DOD Authorization Act so we can get that to the same folks that are telling us we have got to go solve the problem. In the interest of time we are running real short. If you could just get it in to the Task Force we would really appreciate it. Like Pogo says, "We have found the enemy and it is us." Any questions?

MS. BISHOP: What kinds of employment stats do you have at your laboratory? A lot of your testimony has been toward helping the student, but how about employment there? What kinds of numbers are you seeing there? Is the laboratory actively engaged in hiring and promoting upward in the ranks these women and minorities, or is a national recruitment effort going on not just in this area but across the country?

MR. GOMEZ: My testimony today is as a private citizen, not as a representative of Sandia, but I looked at the affirmative action plan that Sandia has, and on paper they

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have a very nice plan for upward movement of minorities and female, handicapped employees. How effective it is, I don't know. We have some members of those groups that are in the pipeline, but the percentages, those numbers are available. I just don't know what they are.

MR. FERNANDEZ: As a private citizen let me answer the question. The national labs as a whole, I believe, are very bad in the hiring of minorities, women and handicapped in their senior staff slots. You can check the stats officially with them and you will find that to be a fact, but I would like to pursue this question of how the Defense Authorization Act has affected the ability of the national labs to do things that they used to be able to support, not only minority programs, but educational institutions. Sandia Labs, I know, for about twenty years was very instrumental in holding up UNM's College of Engineering graduate program. Some of that sort of phased out, but it seems to me like you mentioned the large budget of Sandia, one billion plus. I think you will find that type of budget in most national labs.

The question, though, is how can we get some of that money, especially research money, into the university so that we can not only support the research of the universities, but very specifically provide the framework to bring more minorities, women and handicapped into the graduate programs, and you probably know that one of the keys to the success of

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some of these programs is the dollars are attached to higher graduate assistance. There's all kinds of ways that you can financially aid the graduate students if you have the research dollars, so my question to you is, is Sandia looking at other innovative ways of maybe funding some of that money into the universities?

MR. GOMEZ: The problem with this act is there's a very -- there's a seven-word clause that prohibits them getting involved with that, and it is in the general section. It says, "The following costs are not allowable under covered contract. Item seven is, contributions or donations regardless of the recipient." Those seven words are the thing that does it, so Sandia does have programs which address the problems you have just alluded to, but they are under the guise of recruitment, and it's for recruitment of personnel to the laboratories, and the people you are concerned with are -- targeted people here are included under that recruitment policy rather than a special outreach to get them.

MR. FERNANDEZ: What about things like say one idea has been proposed to rent out chairs at the universities for research and then be able to bring minorities, women and handicapped into the programs through that mechanism. Is that possible?

MR. GOMEZ: I think that's excluded by this. That's what I have been told.

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MR. OAXACA: I think you will face situations where those that don't want to do something will hide behind whatever is convenient, and we need -- we as the Task Force need to work at that because that's what this Task Force is set out to do with that kind of money.

MS. JOSEPH: I would like to provide, for the record, the position of Sandia Laboratory. I understand you are speaking as a private citizen and not for Sandia Lab. On legislation that's aimed at curbing lobbying by the laboratories, all of the weapons laboratories do have activities in each of the areas that we are talking about, and do not interpret the legislation as prohibiting those activities, and the weapons labs as the largest labs usually do have some more significant programs and are looking at exactly the kind of funding you are talking about. That is a model that the University of Tennessee and Oak Ridge National Laboratory in bringing in some of the best and brightest researchers to New Mexico by helping through research funding to support a chair along the state funds and other funds that the university has. Sandia does have a very good network in this area comparable to Los Alamos and other laboratories.

MR. OAXACA: I would submit that Doctor Gomez, having a PhD, probably recognizes that something is wrong, and as a private citizen, because of what we all understand might be retribution by the system, is not at liberty to discuss these

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things to set the policy what Sandia is, but I would think we have to respect the fact that he is an educated individual and senses and knows that something is not happening, being verified by Mr. Fernandez, that the track record is not as good as we might expect, and so I would think that the Task Force would like written inputs from you so that you as one of the leaders of this Task Force can see where the discrepancy is so that we can turn this whole thing into a positive input as opposed to turning off very distinguished witnesses when they testify.

MS. JOSEPH: We are only talking about the piece of law and how that may prohibit programs at Sandia and that law is subject to unlegal interpretations.

MR. OAXACA: Apparently if I understand the testimony correctly it is absolutely with no caveats inhibited.

MR. GOMEZ: That's correct because many of the activities that Sandia used to participate in, they have no longer participated. For example, there are sixteen contributors to the MESA program listed, Sandia is not listed among them, whereas two years ago they were and now they are not.

MR. OAXACA: We have a grand opportunity to now work both sides of the street, and consequently, as it would be a tragedy to not have these laboratories which are the very heart of science and technology to not participate in filling up the pipeline. There's something wrong if somebody is

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interpreting these seven words that were meant to prohibit lobbying from helping fill up the pipeline which were those labs themselves in the future will be the user of this product that is being developed so, you know, whatever you can put down in succinct terms over and above your testimony would be of great help to this Task Force. Thank you.

I would like to ask Mr. John Garcia, the head of the Hispanic Chamber of Commerce of Albuquerque.

MR. GARCIA: Good afternoon. My name is John Garcia. For lack of time I was going to stay brief, but since she put a whole new tape in, why not. I'm the executive director of the Albuquerque Hispanic Chamber of Commerce. On behalf of my board of directors I would like to welcome you to our fair city and as a chamber of commerce person, Hispano Chamber I would like just to to say for those of you who like Albuquerque and you would like to move here, you don't just move to Albuquerque. God has to send you here. We love our city and we love our state.

The Albuquerque Hispano Chamber was founded in 1975, May 26th, according to the articles of incorporation filed at the New Mexico State Corporation with the assistance of thirteen Hispanic business persons, chartered the Albuquerque Hispano Chamber of Commerce with two basic objectives which compelled these individuals to join their individual strengths. One, to preserve the competitive

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enterprise system of business, and two, to promote business and community growth with minority participation. Thirteen businessmen with two broad objectives laid the foundations for what is now a thriving organization of just under one thousand members, twenty-one board of directors and ten active committees, and a professional staff of twelve.

During the past twelve years, our region and chamber has steadily grown, and with this growth we have seen an ever increasing demand for programs designed to help and assist the minority small business person. The Chamber has accomplished much by forming partnerships with public and private organizations by attracting outstanding leadership. In 1986 the Albuquerque Hispano Chamber received the distinction of being named US Chamber of the year from a hundred twenty-five other Hispanic chambers among the country. Yet another accomplishment was received in that through the Department of Commerce we received a grant from the Minority Business Development Agency for the implementation and development of an entrepreneur training program for the minority community to assist the minority community in going into business.

The Albuquerque Hispano Chamber also assists successful businesses in doing business in today's high tech society through workshops, seminars and conferences, trade shows and job fairs such as the one you heard Doctor Casso

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mention. The reason for this special interest for small business is simple, the greater number of employees in our country today. So we assist minorities in developing as professional and successful business owners.

One of the initiatives the Albuquerque Hispano Chamber has implemented is directed particularly towards our youth that addresses the ever-increasing dropout problem that has social and economic repercussions that threaten the foundations on which our society is based. Part of your initiative is to develop role models from the community, a scholarship program in recognition of student-of-the-month program, and a media campaign encouraging our youth to stay in school. As you all are aware, the Hispanic population is the largest growing ethnic group in our country with eighteen million Hispanics and a dropout rate of fifty percent. Either we pay now or we pay later with social programs. We must encourage our youth to stay in school. Since the quality of the nation's work force directly corresponds to its standard of living, the business and general community has a very high stake in the curtailment of student dropouts.

We have worked with the MESA program, the Hispanic University and the Commerciantes program. Recently we worked through one of our high schools, which is in the south valley, predominantly Hispanic area, which was interesting when we talked to over two hundred of our youth that wanted to go into

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higher learning fields, careers as architects, engineers, astronauts, they wanted to be millionaires, but what was sad is when we asked the students to list who their role models were, Jimi Hendrix, Dolly Parton, mother, father. Very few mother, father, and that said to us in the business community that we need to provide some heros, some role models to our youth if we are to encourage them to seek out higher careers in the area of high tech or business.

I think it's also important to note here that we have gone from a highly industrial age country on the east coast to a highly information high tech society here in the southwest, and as the Italians and the Irish and others profited from the industrial age on the east coast, so will the Native Americans and the Hispanics and others living here in the southwest. It is equally essential that we hold our public agencies, schools, universities responsible for the training and development of our youth in this new era which we call the information space age. It is equally important that we prepare our youth for the technical and high tech arena for our school systems and universities especially in the State of New Mexico because of Rio Grande high tech territory which includes Los Alamos, Sandia Laboratories, Kirtland and White Sands.

Many of our youth today here in the New Mexico area are being exposed to buzz words as high tech, computer

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information, Rio Grande corridor, Kirtland, Sandia. Unfortunately, there's not enough role models in these particular fields to encourage those youth to seek out those higher earning careers.

There is a significant contribution in the Hispano Chamber of Commerce can make in their community and throughout our country. Given the opportunity the Hispanic Chamber and small businesses are willing to participate in the development and implementation of programs that would assist all minorities in the high tech arena.

In closing, I would like to recommend the utilization like the Hispano Chamber of commerce, especially our national Hispanic Chamber as one of the appropriate vehicles to implement programs and provide input. I also recommend the continued national support of the minority business firms, the minority set-aside programs, the minority business development agency of the Department of Commerce because if they do well, it will encourage others to do well and that makes good business sense.

Again, it's an honor to be here. I would like to thank all of you for this time. If there are any questions I would be glad to answer them. I have no tickets to the state fair.

MS. BISHOP: Has the chamber ever thought about -- you're talking about role models and that we just don't have enough

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of them, but I am just sitting here thinking whether or not announcing and advertising role models through a media blitz might be a way in which we can get the community aware of who our role models are? You mentioned that they said Dolly Parton, Michael Jackson as role models. While there's nothing wrong with their achievements, we don't see enough and hear enough in the media about other role models, about people who have really made it, about the vice-president whom we just heard from. Has the chamber of commerce with this access to it ever thought about doing something in that area?

MR. GARCIA: Yes, the Albuquerque Hispano Chamber of Commerce through the help of the New Mexico Broadcasting Association and the generous donation of the five thousand dollars by the NEA, National Education -- I forget what it stands for -- National Education Association has given us five thousand dollars to give to New Mexico Broadcasting Assocation as a match. In turn, they have given us over forty thousand dollars of free PSA development with commercials done by Hispanic youth, done by people here in town who have put together a very effective PSA testimony encouraging our youth to stay in school with the slogan at the end saying, "Use your head to get ahead." This has become very effective and it's catching on by a lot of other radio stations that are developing their own PSA's now. The local TV stations are getting involved in this, and what they want to do is take

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role models. They want Herb Fernandez to say, "Here's what I do with the Department of Energy, and I encourage you to stay in school. Use your head to get ahead."

We are seeking out the business community, the highly visible political business community to encourage our youth to stay in school because this not only affects the Hispanics, but Blacks, Native Americans and Whites are being affected by this critical problem facing our country and that's the dropout rate.

MR. OAXACA: Thank you very much for your testimony.

MR. FERNANDEZ: Just a short question. You just finished that study on dropouts. Can you quickly give us what the numbers are?

MR. GARCIA: The Albuquerque Hispano Chamber of Commerce just recently did a study on dropout problems here in Albuquerque and in New Mexico. We have found that there is roughly at least a thirty-percent dropout among minorities or Hispanics here in the Albuquerque area, though a lot of times the reporting system isn't done properly, we feel. By that, the school systems seem to report on the senior class rather than taking the freshman class all the way through and trying to see how many kids are dropping out. There is a problem. You have thirty-five percent Hispanics in the City of Albuquerque, and we have that large dropout rate.

MR. OAXACA: Thank you very much. We would like to ask

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that Dean Ann Erickson, the School of Humanities and Science of Salt Lake Community college in Salt Lake City, and that city is a role model. It's laid out mathematically, and I used to have a friend that lived in the first quadrant.

MS. ERICKSON: That provided some prestige, I suppose. I suppose one of the problems of being at the end of a program is that perhaps some of your topics have been addressed by others, and that, in fact, is the case with me today, but I have chosen to take maybe just a little different track than I was going to after hearing some of the testimony from some of the other people. Let me give you just a little bit of my background, a little bit more about the demographics of Utah because I think it's very important in relationship to what I am going to say.

My background is that I taught mathematics in a community college for eleven years before I became TR college administrator, which is what I am presently. I am perhaps an example of a reentry woman of sorts in that I am a doctoral candidate presently and have those distinctive initials behind my name of a PhD. Everything but the dissertation, which is the next project. I have served on the governor's task force for integrating women into the work force in Utah, and I am presently serving on the governor's science council. I am the only female member on the governor's science council, and that came after several years of long lobbying to accomplish

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getting a woman on that group, and I'm also a representative of the two-year colleges because we believe strongly technician training is every bit as important as PhD training in today's age.

Let me tell you just a bit about the demographics of Utah. It's a sparsely populated state. Population of only about one-and-a-half million. In the large geographical area there are nine public institutions of higher education. They are spread out throughout that state and the access is difficult. In addition to these statistics, Utah has twice the birth rate in comparison to the national average, and therefore, we have a large college population, growing and little money to support that large college population and public school population, as well.

Interestingly enough in a recent survey that was done in Utah, it was determined that Utah is twelfth in the percentage of students who graduate, and first in the number of years of average years of students in their completion rate in school. The number of years that they complete is first in the nation. In spite of that, we are last in the number of the percentage of women attending college and in the number of bachelor's degrees awarded to women when compared to men, and so there is a unique problem in the State of Utah.

As I was making a change in my career in 1979, going from a community college mathematics teacher to an

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administrator, I had an opportunity to attend two different workshops very close together. They were National Science Foundation sponsored workshops. One was called "Overcoming Math Avoidance and Anxiety," and at the conclusion of that workshop I had the opportunity to attend an Expanding Your Horizons Conference in science and mathematics which you have heard about twice before today. That was at Mills College in Oakland. Those two events had a real profound effect on me, and perhaps validated some things I had been observing over the years as a mathematics teacher, and had an influence, I think, perhaps on the young women on the State of Utah because of what happened later.

I think Ms. Torres has described to you what these Expand Your Horizons Conferences are all about, so I won't go into that in detail, but as I was coming back from this experience in Oakland, California on an airplane back to Salt Lake thinking about the demographics of our state, and what I felt was a real resistance to this sort of thing in Utah. I had a dream, and that was to establish a network, math science network in Utah and see if this was a need that we had, and did that when I got back and got a group of friends of mine together and we put this math science network together. Well, to give you just a summary of what's happened, we held the first conference in 1980 and had fewer than one hundred young women attend the conference. This year we had almost two

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thousand young women attend the conferences in the State of Utah. The network has grown from one small group in Salt Lake City to now six chapters throughout the state, and we are holding at least five conferences a year. That may not seem like a lot, but in a state like ours it has made quite a profound impact, and I think we have over seven thousand students attend in the eight years the conference has been in action.

This is an example of a point that I think has been also been made over and over again, which is perhaps the main point of my observations to the committee. As a community college administrator, and a college that used to be called Utah Technical College and has just recently had its name change and its function broadened a bit, I have worked with advisory committees for eight years. The advisory committees have been of women from the community who work with technical and vocational programs at our college, and I can tell you that, in my opinion, the most effective use of any sort of money and support is one that supports collaboration. Collaboration between the business and industry communities and the educational communities, because as Doctor Casso stated earlier, this is believed to be by both entities good money, well spent.

And so I'm suggesting that in these Expanding Your Horizons Conferences that this group of women, which is a

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totally voluntary group. We have had no money donated to support the network. All of it has been funded by donations from private industry, from educational community, small local grants from education and then the small amount of money that the girls paid to attend the conference, but in our rather limited statistical data we have found that these young women do feel like their attitudes have been changed as they participate in a day-long conference with role models and opportunities to see that staying in a math science track, not filtering themselves out of that opportunity, those attitudes have changed by the time they have had an experience one day.

One of my recommendations is that incentive money be provided to encourage collaboration between business and industry and the educational community to make the best use of our money. I think in many cases industry simply has to be asked to help and contribute, and at least token money put there by other entities within the system. Second thing that I have been involved in that I would like to tell you about is another example of collaboration, and this primarily is between two-year colleges and four-year colleges in the State of Utah. I believe that the best entrance into higher education for minorities and women is through the two-year colleges, as I think the literature will support as you read that data. In the state because of the isolation of some of the colleges, because of leaders and other things that we

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educators seem to have in common, we did not have a good system to allow students to go from preengineering programs in two-year colleges onto four-year institutions, and yet as the financial problems are increasing in the state it seems that that is where students are going to have to enter higher education.

So three years ago Dean Joe Andretti, who is the Dean of Engineering at the University of Utah, and I put together an engineering liasion committee which brings together representatives of engineering programs in all of two-year colleges and the four-year colleges in the State of Utah on a quarterly basis to discuss problems of transferability of credits to course work that is similar and to facilitate students entering two-year colleges getting the first two years in the two-years colleges in the engineering programs and then moving on into the four-year institution. Now there isn't anything unique about encouraging students to do that, except that the liaison committee coming together has solved many problems.

One of the things that has happened as a result of that is a document that identifies course work that is transferable among all institutions in the state. We are going to take as an agenda item this year ways to attract more women and minorities into the program, and the discussion together has been the important thing, bringing the

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discipline, the people together in the discipline from all segments of education, and that is in our state working very well. So I guess my two points that I think these examples bring have to do with incentives involving collaboration and with communication among all segments of private industry and education in order to encourage this group of the population that does not seem to have as great an access as white Anglo-Saxon males.

MR. OAXACA: Thank you so much. We are particularly pleased that you came here. We understand that Senator Orrin Hatch recommended you, and of course, the good senator was one of the sponsors of the language and the law that ultimately turned out to form the Task Force, and so now we can put the arm on you to put the arm on him in the future when we need that sort of thing. He's a neat guy.

MS. ERICKSON: You were reading my mind. I certainly plan on doing that when I get back to Salt Lake City.

MS. SABATINI: Your comments on the cooperation between the two- and four-year colleges is very interesting. In Pennsylvania there is another kind of cooperation which is particularly pertinent to this committee in that in the counties they support the two-year colleges with local funds. They do not -- they can not support the state colleges because that comes from another funding source, so their collaboration has been arranged and experimentation whereby an engineering

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student or a technology student can go to the two-year college at the much lower tuition rate, get the two years and then go on to the four-year college and thus not have to spend all of that terribly high tuition and lack of access to the county funding by going to the four-year college, and it's an experiment that's just started and I will keep the Task Force apprised of it because it's a way of helping people who don't have money for the four-year colleges.

MS. ERICKSON: Absolutely, and I would suggest that that sort of thing is only possible if there is an agreement among the two-year colleges and the four-year colleges of acceptability of credit and not putting a student through retaking courses because we didn't teach it to him as sometimes is the case, and that is the grinding point of what our goal has been. We have been working with MESA and with outreach programs along those lines as well. I haven't had time to talk about that, but I would think that if we could tie in incentives in some way to encourage two- and four-year colleges to get together and talk these things through, whether it's through county funds versus state funds, they are not all funded that way, but my notion of incentives I think applies within the educational community as well as between business and industry and education.

MR. OAXACA: A great lead-in for our next witness.

MR. FERNANDEZ: A quick question to follow the point of

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transferability of credits. That's serious national problem today because what we have done consciously or unconsciously, we have dumped people on two-year institutions to train them for four-year institutions without really preparing those two-year institutions to do the job. I serve on the Commission of Higher Education in New Mexico, and we are trying to address that question, but it seems to me like one bottom line simple solution after going through all the negotiations and the agreements is very simple. Identify by course number the same course number in the two-year institutions, four-year institutions and you have your agreement that if they are identical, they are transferable. Earlier I would agree with you. It's a very difficult thing to accomplish when you have a lot of years of history of autonomy of each institution to determine their course numbers.

One of the problems we have run into is that the state board of regents mandates that we teach only courses through sophomore level, and I think any of you who are involved in technology know that in our associates, it requires more than two years to get people prepared in electronics technology and some of the other areas. As a result of that, and some other things that have happened, students at the universities in the state are taking what they call sophomore courses but they have three hundred numbers, and we can't teach three hundred numbers unless we get this

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worked out because of the mandated board of regents, so one of the things we have done on our engineering liaison committee is include a member of the staff of the board of regents, and he acts as liaison for the liaison committee back to the board, but that has helped us get some of these things through because of the bureaucracy that simply gets in the way. We ask the question why and nobody knows the answer.

MR. FERNANDEZ: I'm not sure these figures are correct, but in California the letter to the editor this last week in one of the academic journals, that out of approximately a million two-year students they are only transferring approximately fifty-five thousand. If that's a correct figure, we are using California as a base line, we have got some real serious problems.

MS. ERICKSON: I think it's more like ten percent, ten or fifteen percent around the country. That may be true in California. I know in some states that number is going down, the number of students who are transferring from two-year institutions. We are hoping it's going to go up in Utah because we have the largest percentage of students entering four-year institutions as well as any state in the country.

MR. OAXACA: Thank you so much. Jim Tarro, Digital Equipment Corporation. He single-handedly is taking on IBM.

MR. TARRO: In the I guess about fifteen minutes that I have been here I have heard MESA mentioned five or six times,

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and that's what I am here to talk to you about this afternoon, is MESA, and for those of you that are not from Albuquerque, we talk about the MESA out here on the west mesa. In Spanish it's a table. This is a different kind of mesa. MESA is an acronym that stands for Mathematics Engineering Science Achievement, and to talk to you about MESA I would like to tell you just a little bit about myself by a way of introduction, and then tell you what the MESA program is in New Mexico. I would like to give you a little bit of the rationale for having a MESA program, and also I would like to tell you what I believe would happen if we didn't have a MESA program. I would like to present you with some facts and data. The accomplishments of MESA in New Mexico, a little bit about how they operate fiscally, and talk a little bit about New Mexico MESA's future and what we think or where we see New Mexico MESA going.

I am an engineer by profession. As Mr. Oaxaca mentioned, I work with Digital Equipment Corporation, and I have been in the high tech manufacturing business for twenty-seven years working many various functions of that kind of business. I'm a Mexican American. Have been one all of my life, and have a passion for the kinds of issues that we see here in the southwest. I have been the chairman of the board of New Mexico MESA for the past two years. I'm not sure if that was in '83. I'm not quite sure now. As I mentioned,

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MESA is a acronym. It stand for Mathematics Engineering Science Achievement. The MESA program was founded in California somewhere about eighteen years ago, and since then MESA programs have been established in a number of states in the US. As of June 31st this year, New Mexico MESA completed its fifth year of successful activity.

MESA is designed to increase the number of underrepresented minorities in the professions related to mathematics, engineering and physical sciences. Because these fields currently attract a disproportionately small percentage of Blacks, Hispanic and Native Americans, New Mexico high school students from these backgrounds are the students -- are the target of the MESA program. Through MESA's efforts, participating students receive the educational enrichment experiences and practical health that they need to prepare themselves for university level programs in engineering and science.

The New Mexico MESA program is housed and operated out of the University of New Mexico center in the Ferris Engineering Building at the University of New Mexico. The New Mexico MESA project director is Patricia Chavez. She is the woman sitting right there in the green dress. She implements the various components of the MESA program and manages their operation at each of the MESA high schools. There is a secretary who manages the MESA office, handling the

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communications and the organizational needs of the staff. Also, there is a person who coordinates New Mexico MESA within the Albuquerque Public School System. In order to become a member of MESA, high school students must, one, take algebra I and complete trigonometry by graduation, be of an ethnic group underrepresented in a math based field, particularly Native American, Hispanic or Black and three, have expressed an interest in pursuing a math based field.

The MESA program provides a number of opportunities for opportunities who are participants. Tutors in mathematics and science are assigned to each high school. Additional tutoring is available on the UNM campus on Saturday mornings. Each school's MESA group participates in several field trips per year. The trips are planned according to the interests of the students and cover a wide variety of abilities and situations. Incentive awards provide financial support for students who perform well in their classes. A student may qualify for a partial award by maintaining a three point four grade point average, A equaling four, either math, science and English classes each year after their sophomore year. A full award is earned by scoring well on standard college entrance examination as well as maintaining a three point four GPA.

The summer school program offers courses which are not available in the regular high school curriculum. The summer classes are designed to complement the students'

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academic year subjects and to provide as close to a college level academic experience as the student is able to handle. The summer school is staffed by college professors, high school teachers and college graduate students. As of the moment of this testimony, there are twelve schools associated with New Mexico MESA, and including Albuquerque, Bernalillo, Santa Fe and West Las Vegas schools. So you can see this program is not just in an Albuquerque program, but it is a statewide program. The framework on which all of the aforementioned is connected to is the MESA parents and supporting industries and businesses. The MESA parents are the glue that keep the students sticking to the program through encouragement to study and direct involvement with MESA program logistics and functions. The rest of the framework is made up of the industries and businesses that provide the monies and services in kind that as of this date provide one hundred percent of financial support in the New Mexico MESA program.

About the rationale for this program, MESA is a grassroots effort to raise the awareness of underrepresented minorities about the opportunities that exist in the professions using mathematics and physical sciences. If we don't have programs like MESA, then not only do they underrepresent minorities, but all of society loses without the opportunity to advance in social position, through

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contribution of one's labor, the multi-generation a transmission of ignorance and mental deprivation continues for lower economic -- socio-economics of whom the majority in our nation are ethnic minorities.

When programs such as MESA are established and supported, we have the ability for the aforementioned minority citizens to become competent and competitive in the professions. This results in an additive factor to our nation's gross national product, and a multiplier effect that trickles down to every remnant of our citizenry. MESA students, upon completion of their programs, can begin their profession at salaries of twenty-eight thousand dollars per year and up. The cycle for these winners turns upwards. They can provide an optimistic future for their offspring, become a mentor to others following in their footsteps and have a positive impact to the general welfare of our society.

For the staff here of the Task Force I have included in the package here a lot of data, round figures and so forth. I don't think I have the time to cover them, but I would like to point out the ethnic makeup. We have two hundred and forty-seven males in the program, three hundred and fifty-seven females, a total of six hundred and four people for 1985-1986 enrollment. Black Americans represent four percent, American Indians represent seven percent, Hispanics represents eighty-six percent and others are three.

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The senior profile we have this year 1985-'86, zero Blacks, four American Indians, sixty-nine Hispanics for a total of seventy-three. I just might mention that this year's graduating class had a national emeritus scholar, four of them valedictorians.

I would like that when the Task Force reviews this material that they note the kinds of monies it takes to make a program go like this. We need a budget here for '86-'87 of eighty thousand dollars. We are scratching the surface. We raise that money through contributions. If I could take one minute I will read a concluding paragraph. I think that what I would like to point out to the Task Force is that this state's most accessible free college academic preparation program to continue forward with its efforts and its results for that to happen, New Mexico MESA must have three important things. One, we need to have services provided in kind to us. We need equipment donations, and most of all, we need free financial donations.

The next step to be accomplished to ensure the continuation and growth of New Mexico MESA we need to win state legislative approval to provide annual funds. MESA needs to know that a regular and consistent amount of money exists so that plans can be made beyond the horizon of twelve months. The creativity and growth that is really required for the New Mexico MESA program cannot be multiplied by its

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existing funds. These investments in our children are investments in everyone's future. Perhaps a longer range vision had show us a program of federal funding for MESA programs across the country. Maybe matching funds to states will be an incentive to establish MESA programs throughout America.

In closure I wish to thank the Task Force on Women, Minorities and Handicapped in Science and Technology for inviting me here to share information about one program that is making the difference. Thank you.

MR. OAXACA: Thank you very much. I happen to have the privilege of working with Jim in California way back when you could hold the first meeting of MESA in a phone booth, and it's really a wonderful model and I think that it's a program that merits the attention at the federal level. It's been so successful. It actually has the numbers that back it up, and I think it's a fine program. Any questions? Thank you so much, Jim.

Last but not least, and we thank you all for your patience, we have Doctor Kirk MacGugan who is going to testify, and she is with the Client Assistance Project of the Protection and Advocacy system. Welcome to the afternoon session, and you have the distinction of being the last one, but you can keep us here as long as you want.

DOCTOR MAC GUGAN: I won't do that. It's been a long

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day. I wanted to welcome you all also to New Mexico late in the day, and thank you very much for this opportunity to make a presentation to you. The reason why I have been asked to do this is because one, I am a disabled woman, two, I am a disabled consumer of science and technology, and have fairly recently completed a doctoral program wherein I did a study on east-west attitudes toward illnesses and handicapping conditions which is attached to my presentation and is published in Eric Resources for junior colleges, Resources in Education, Eric Clearinghouse for junior colleges, UCLA. There are some other publications, also, that I participated in that are also attached to my presentation, and give you, again, a bit of an idea of why I have been asked to come today.

I lived in Hawaii a long time before coming back home to New Mexico, and participated in quite a few projects that had to do with developing various kinds of programs, not necessarily specifically related to science and technology, but nonetheless programs for disabled women. I think that there's probably a bit of syncronicity in being the last person to speak to a Task Force like this because I want to turn around, I think, a lot of what you have been hearing today and talk about, in a sense, how science and technology is not working on a human level. I have been sitting here for this whole day, sort of floating around with you, I think, in

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some wonderful programmatic clouds, and trying my best to ascertain how I can apply those to my own life as a disabled woman, as a disabled consumer, and how I can also apply it to my world of work, which has to do with protection and advocacy for disabled individuals. I am going to talk to you about the social aspects affecting present and future opportunities for disabled women related to science and technology, and would hope that the problems that I am going to present to you would be seriously considered by you as recommendations for all of you to think seriously about and to take a look at.

A not so subtle media blitz aimed at women who, quote, "Want it and to have it all," excludes consideration of disabled women. The media presentation referred to portrays a chic, very sexy, able-bodied female and a two-piece suit who, quote, "brings home the bacon," money, and quote, "frys it up in a pan" in a split-level condo for a grateful husband and two point five well-behaved children. This quote, "glamorous," and quote, "fulfilled" typecasting may not represent the real world, but certainly it is ludicrous in its appeal to a disabled woman observing this American dream while sitting in a nonaesthetically designed "x" frame wheelchair, manual or power, trying to fit her permanent sitting situation into clothing designed for standing, size nine, and unable to venture too far from her accessible home bathroom because there does not exist for her a safe and available urinary

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appliance without instilling tubes that not only breed inconvenience and discomfort, but infection.

The simple fact persists related to our above described disabled woman, research and design in science and technology, specifically related to disabled women practically is nonexistent. In other words, the technology is not there for disabled women who want to work, have a home and go everywhere. For example, first, not all orthopedically disabled women want to or can access the world in a sports chair with minimal foot rests and cut down back and body support. Instead, many physically handicapped women still search for the chair of the future so as they -- particularly designed as to put the person up front rather than the machine, liberating, light-weight, noiseless and easy to repair. A piece of technology that along with the exercise of the strong body image and a lot of self-esteem literally disappeared to allow the person who occupy center stage.

Second, science and technology have made one point clear to disabled women. Research and development aimed at the recreational world of disabled persons is not transferrable to the home of a disabled woman. For instance, interchangeable furniture design is lacking as well as tub access technology for women who, believe it or not, do not prefer showers. Also swimming pool access that recommends independence and is not bolted to the floor or hooked to a

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generator is shortsighted, and light-weight maneuverable vacuum cleaners as well as reachable and accessible washers and dryers are unavailable.

The fact remains that because of a glitz in technology most disabled persons cannot mow their own lawns, go fishing, grow their own gardens, independently shop for their own clothes in department stores because of the lack or absence of accessible dressing rooms or live as a single women or single parents with children because of the lack of utilization of accessible apartment and housing design. In my opinion, there are two problems for the disabled woman trying to live in a physically inaccessible jungle. One, the lack of programs in science and technology aimed specifically at disabled women and two, the persistence of a variety of culture specific attitudes toward disabled women which discouraged them from lobbying, "think for better living through science and technology."

To begin with, the consciousness raising and assertiveness training aspects of the women liberation movement did not include or think to incorporate disabled women. Such assertiveness training for disabled women may require even stronger demands on dealing with dependence issues and a cycle of rehabilitation engineering. For example, the belief persists, coming from somewhere else aimed at disabled women in culture specific settings like Hispanic

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and Native American women in New Mexico, that disabled women aren't interested in science and technology. Disabled women aren't capable of entering the world of science and technology. This realm is not there for them, and this attitude lingers despite the rapidly developing historical contact that Hispanic and Native American women are agriculturals, agronomists, brick layers, masons, plasterers, alchemists, chemists and astronomers. Also the absence of programs in science and technology aimed at minority disabled women, and secondary or most secondary education limits their participation and their ability to combat such misplaced and erroneous attitudes.

Not only must science and technology promote survival programs for disabled women, assertiveness training, co-invention with university engineering departments in transportation access design, but science and technology must be sensitive to the way it advertises itself, like Ms. Bishop's questions a minute ago, relative to disabled men rather than disabled women. The absence of the capable disabled woman in the media is another reflection of culture specific attitudes toward them. For instance, if disabled people in general are, quote, "confined to wheelchairs," disabled women are more specifically so. If disabled people in general are, quote, "victims of their," quote, "condition," disabled women are more specifically so, and literally,

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disabled minority women are lost in their traditional settings.

As a solution to this dilemna, disabled women need to see successful disabled role models employed in science and technology, supported by affordable rehabilitation, engineering and a recognized and subsidized nationwide personal care attendance system. The implementation of the 1986 rehabilitation amendment requiring state divisions of vocational rehabilitation to serve severely disabled persons through supported employment and rehabilitation engineering is vital to meeting this need. In this regard it is imperative that disabled women are seen and see each other accessing the world like disabled and able-bodied men.

Finally, sex, technology and the disabled man continues to go get design and advertisement priority over sex, technology and the disabled woman, and if attitudes toward women in general from the medical profession are problematic, which we are, they are archaic when related to disabled women who are seen as helpless children. Science and technology, therefore, must make an asserted effort to develop and support programs that bring more disabled women in as managers and advocacy related to health care. I would close with a quote from a woman I admire very much, Caroline Barb, who the last time I heard was a consultant in the psychology rehabilitation engineering at Los Amigos Hospital in Los

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Angeles. Her quote sums up the challenge, I think, for your Task Force and the challenge for science and technology when you are specifically thinking of disabled women. Quote, "We must try to harness the growth capitalizing power of the experience of being different."

In conclusion, science and technology must make a genuine effort to minimize rather than maximize life access barriers for disabled women.

MR. OAXACA: Thank you very much. Any questions? Tremendously profound, and you can rest assured that at least in my particular case, today has been a significant learning experience for me, and I have been in this ball game for three decades, and today was just an absolute experience for me. On the part of the Task Force, speaking for Ann Reynolds who had to leave early and myself, I would like to commend the distinguished witnesses for their carefully thought out testimony, the Task Force members and their committees for their progress, the executive director and her staff, the people of Albuquerque for their welcome and warm hospitality, and I declare the meeting on this first public hearing held by the Task Force on Women, Minorities and the Handicapped, I declare the meeting adjourned. Thank you very much and God bless you.

(THEREUPON, the proceedings were concluded.)

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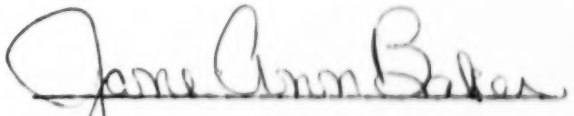
I FURTHER CERTIFY that I am not employed by any of the parties to this action or attorneys appearing herein, and that I have no financial interest in the outcome of this case.

WITNESS my hand this 4th day of October, 1987, at my offices in Albuquerque, New Mexico.



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